United States Government Accountability Office

GAO

Testimony

Before the Committee on the Judiciary, House of Representatives

For Release on Delivery
Expected at 1:00 p.m. EDT
Thursday, September 8, 2005

INTELLECTUAL PROPERTY

Improvements Needed to Better Manage Patent Office Automation and Address Workforce Challenges

Statement of Anu K. Mittal, Director
Science and Technology Issues
and
Linda D. Koontz, Director
Information Management Issues

September 8, 2005

GAO
Accountability·Integrity·Reliability
Highlights

Highlights of GAO-05-1008T, testimony before the House Committee on the Judiciary

INTELLECTUAL PROPERTY

Improvements Needed to Better Manage Patent Office Automation and Address Workforce Challenges

Why GAO Did This Study

The United States Patent and Trademark Office (USPTO) is responsible for issuing patents that protect new ideas and investments in innovation and creativity. However, the volume and complexity of patent applications to the agency have increased significantly in recent years, lengthening the time needed to process patents and raising concerns about the validity of the patents that are issued. Annual applications have grown from about 185,000 to over 350,000 in the last 10 years and are projected to exceed 450,000 by 2009. Coupled with this growth is a backlog of about 750,000 applications. Further complicating matters, the agency has faced difficulty in attracting and retaining qualified staff to process patent applications.

USPTO has long recognized the need to automate its patent processing and, over the past two decades, has been engaged in various automation projects. More recently, in its strategic plan, the agency articulated its approach for accelerating the use of automation and improving workforce quality. In two reports issued in June 2005, GAO discussed progress and problems that the agency faces as it develops its electronic patent process, its actions to attain a highly qualified patent examination workforce, and the progress of the agency's strategic plan initiatives.

At the Committee's request, this testimony summarizes the results of these GAO reports.

www.gao.gov/cgi-bin/getrpt?GAO-05-1008T.

To view the full product, including the scope and methodology, click on the link above.For more information, contact Anu Mittal at (202) 512-3841 or mittala@gao.gov or Linda Koontz at (202) 512-6240 or koontzl@gao.gov.

What GAO Found

As part of its strategy to achieve an electronic patent process, USPTO had planned to deliver an operational patent system by October 2004. It has delivered important capabilities, for example, allowing patent applicants to electronically file and view the status of their applications and the public to search published patents. Nonetheless, after spending over $1 billion on its efforts from 1983 through 2004, the agency has not yet developed the fully integrated, electronic patent process articulated in its automation plans, and when and how it will achieve this process is uncertain. Key systems that the agency is relying on to help reach this goal—an electronic application filing system and a document imaging system—have not provided capabilities that are essential to operating in a fully electronic environment. Contributing to this situation is the agency's ineffective planning for and management of its patent automation initiatives, due in large measure to enterprise-level, systemic weaknesses in its information technology investment management processes. Although the agency has begun instituting essential investment management mechanisms, such as its enterprise architecture framework, it has not yet finalized its capital planning and investment control process, or established necessary linkages between the process and its architecture to guide the development and implementation of its information technology. The Under Secretary of Commerce for Intellectual Property and the agency's chief information officer have acknowledged the need for improvement.

USPTO has taken steps to attract and retain a highly qualified patent examination workforce by, for example, enhancing its recruiting efforts and using many of the human capital benefits available under federal personnel regulations. However, it is too soon to determine the long-term success of the agency's efforts because they have been in place only a short time and have not been consistently sustained because of budgetary constraints. Long-term uncertainty about the agency's hiring and retention success is also due to the unknown impact of the economy. In the past, the agency had more difficulty recruiting and retaining staff when the economy was doing well. Further, USPTO faces three long-standing challenges that could undermine its efforts: the lack of an effective strategy to communicate and collaborate with examiners, outdated assumptions in production quotas that it uses to reward examiners, and the lack of required ongoing technical training for examiners. Patent examiners said the lack of a collaborative work environment has lowered morale and created an atmosphere of distrust between management and patent examiners.

Overall, USPTO has made more progress in implementing its strategic plan initiatives aimed at increasing its patent processing capability through workforce and process improvements than in its initiatives to decrease patent pendency and improve electronic processing. It has fully or partially implemented all 23 capability initiatives, but only 8 of 15 initiatives to reduce patent pendency and improve electronic processing. The agency cited a lack of funding as the primary reason for not implementing all initiatives.

Mr. Chairman and Members of the Committee:

We are pleased to be here today to participate in your oversight hearing of the United States Patent and Trademark Office's (USPTO) efforts to modernize its patent application processing capability. Our testimony focuses on several critical aspects of the agency's overall goal: (1) its ongoing initiative to achieve a paperless, electronic patent process, (2) its actions to attract and retain a highly qualified patent examiner workforce and address human capital challenges, and (3) the implementation of critical initiatives outlined in its 21st Century Strategic Plan—issued in 2002 in response to a congressional requirement that the agency improve patent quality, implement electronic government, and reduce the number of pending patent claims.[1]

Rapid growth in both the volume and complexity of patent applications to USPTO has lengthened the time needed to process patents and has raised concerns among intellectual property organizations, patent holders, and others about the quality of the patents that are issued. Over the last 10 years, the number of patent applications filed annually has increased 91 percent, from about 185,000 in 1994 to over 350,000 in 2004. Along with this growing workload is a 28-month backlog of approximately 750,000 applications. Further complicating this picture, is that USPTO's resources have not kept pace with the increases in its patent workload. Agency officials acknowledge that, at times, they have had difficulty competing with the private sector to attract and retain staff with the high degree of scientific, technical, and legal knowledge required to be patent examiners.

Recognizing the need to improve its patent processing capability, over the past 2 decades, USPTO has undertaken various efforts to automate its patent process. In addition, as part of an aggressive 5-year modernization effort outlined in its strategic plan, the agency has articulated its approach to creating a more productive and responsive patent organization through accelerating its use of automation and enhancing the quality of its patent examination workforce. At the request of the Committee, our testimony today summarizes the work presented in two reports that we issued in June 2005—one addressing the agency's progress, and problems faced, in developing and using electronic information and systems to achieve its

[1]Patent and Trademark Office Authorization Act of 2002, Pub. L. No. 107-273, § 13104, 116 Stat. 1899, 1900, required USPTO to develop a 5-year strategic plan for meeting these three requirements. USPTO also prepared the Strategic Plan to fulfill the requirements of the Government Performance and Results Act.

automated patent processing capability[2] and the other addressing its steps to attract and retain a workforce of qualified patent examiners, three long-standing human capital challenges that could undermine recent efforts, and the overall status in implementing its strategic plan.[3]

In summary, we found the following:

USPTO is pursuing a long-standing strategy to implement a paperless, electronic patent process, with the goal of replacing the manual processing of applications with an electronic process for researching patent information and viewing and manipulating application text throughout all processing phases. While the agency has achieved important electronic capabilities through information systems that it has implemented, such as electronic filing and patent application classification and search, collectively these functions have not provided the fully integrated electronic patent processing capability articulated in its automation plans. Two of the primary systems that the agency is relying on to enhance its capabilities—its electronic filing system and a document imaging system that it acquired from the European Patent Office—have not yielded processing improvements that the agency considers essential to operate successfully in an electronic environment. Contributing to this situation are ineffective planning and management of its patent automation projects—due in large measure to enterprise-level, systemic weaknesses in its information technology investment management processes.[4] Although the agency had begun instituting certain essential investment management mechanisms, it had not yet finalized its capital planning and investment control process and had not established the necessary linkages between the process and its enterprise architecture to ensure that projects will comply with the architecture.[5] As a result, the

[2]GAO, *Intellectual Property: Key Processes for Managing Patent Automation Strategy Need Strengthening*, GAO-05-336 (Washington, D.C.: June 17, 2005).

[3]GAO, *Intellectual Property: USPTO Has Made Progress in Hiring Examiners, but Challenges to Retention Remain*, GAO-05-720 (Washington, D.C.: June 17, 2005).

[4]A key requirement of the Clinger-Cohen Act of 1996 (40 U.S.C.§11312) is that agencies have capital planning and investment control processes. Such processes aid management by providing a means to obtain necessary information about the progress of an investment in terms of cost, capability of the system to meet specified requirements, timeliness, and quality.

[5]An enterprise architecture serves as a blueprint for systematically and completely defining an organization's current operational and technology environment and as a roadmap toward the desired state.

agency had not rigorously assessed its patent systems' compliance with the enterprise architecture and it lacked reliable experience-based data to consistently demonstrate the costs and benefits of its systems.

In addition, to help attract and retain a qualified patent examination workforce, USPTO has taken steps such as enhancing its recruiting efforts and using many of the human capital benefits available under federal personnel regulations. However, it is too soon to determine the long-term success of the agency's recruiting efforts because they have been in place only a short time and have not been consistently sustained because of budgetary constraints. Long-term uncertainty about USPTO's hiring and retention success is also due to the unknown impact of the economy. In the past, when the economy was doing well, the agency had more difficulty recruiting and retaining the staff it needed. Further, USPTO faces three long-standing challenges that could undermine its efforts to retain a qualified workforce: (1) the lack of an effective strategy to communicate and collaborate with examiners, (2) outdated assumptions in the application processing quotas it uses to reward examiners, and (3) the lack of required ongoing technical training for examiners. According to patent examiners, the lack of communication and a collaborative work environment has resulted in low morale and an atmosphere of distrust that is exacerbated by the contentious relationship between management and union officials.

Overall, USPTO has made more progress in implementing its strategic plan initiatives to increase the agency's capability than it has in implementing the initiatives to decrease patent pendency[6] and improve electronic processing. The agency has fully or partially implemented all 23 capability initiatives that focus on improving the skills of employees, enhancing quality assurance, and altering the patent system through changes in existing laws or regulations. In contrast, the agency has partially or fully implemented only 8 of the 15 initiatives aimed at reducing patent pendency and improving electronic processing. A lack of funding was cited as the primary reason for not implementing these initiatives. With the passage of legislation in December 2004 to increase fees available to USPTO for the next 2 years, the agency is reevaluating the feasibility of implementing some of these initiatives.

[6]The time between filing for and being granted a patent historically has been referred to as "patent pendency."

In our reports, we made recommendations aimed at improving the agency's management of its patent automation strategy and related information technology investments and at enhancing communication and collaboration between management and patent examiners, and between management and union officials. USPTO generally agreed with the findings, conclusions, and recommendations in both reports, although it only partially agreed with several material aspects of our assessment of its patent automation strategy, including our recommendation that it reassess its approach to automating its patent process.

Background

USPTO helps promote industrial and technological progress in the United States and strengthen the national economy by administering the laws relating to patents and trademarks. A critical part of its mission is examining patent applications and issuing patents. A patent is a property right granted by the U.S. government to an inventor who secures, generally for 20 years from the date of initial application in the United States, his or her exclusive right to make, use, offer for sale, or sell the invention in exchange for disclosing it.[7] The number of patent filings to USPTO continues to grow and, by 2009, the agency is projecting receipt of over 450,000 patent applications annually.

Patent processing essentially involves three phases: pre-examination, examination, and post-examination. The process begins when an applicant files a patent application and pays a filing fee. During the pre-examination phase, patent office staff document receipt of the application and process the application fee, scan and convert the paper documents to electronic format, and conduct an initial review of the application and classify it by subject matter. During the subsequent examination phase, the application is assigned to a patent examiner with expertise in the subject area[8] who searches existing U.S. and foreign patents, journals, and other literature and, as necessary, contacts the applicant to resolve questions and obtain additional information to determine whether the proposed invention can

[7]According to 35 U.S.C. §154(a)(1), a patentee may also exclude others from importing the patented invention into the United States.

[8]USPTO has eight technology centers that define its subject areas as follows: Biotechnology and Organic Chemistry; Chemical and Materials Engineering; Computer Architecture, Software, and Information Security; Communications; Semiconductors, Electrical and Optical Systems and Components; Designs for Articles of Manufacture; Transportation, Construction, Electronic Commerce, Agriculture, National Security and License and Review; Mechanical Engineering, Manufacturing, and Products.

be patented.[9] Examiners document their determinations on the applications in formal correspondence, referred to as office actions. Applicants may abandon their applications at any time during this process. If the examiner determines that a patent is warranted, a supervisor reviews and approves it and the applicant is informed of the outcome. The application then enters the post-examination phase and, upon payment of an "issue fee," a patent is granted and published.[10] Historically, the time from the date that a patent application is filed to the date that the patent is either granted or the application is abandoned has been called "patent pendency."

Because of long-standing concerns about the increasing volume and complexity of patent applications, USPTO has been undertaking projects to automate its patent process for about the past two decades. In 1983, the agency began one of its most substantial projects—the Automated Patent System (APS)—with the intent of automating all aspects of the patent process. APS was to be deployed in 1990 and, when completed, consist of five integrated subsystems that would (1) fully automate incoming patent applications; (2) allow examiners to electronically search the text of granted U.S. patents and access selected abstracts of foreign patents; (3) scan and allow examiners to retrieve, display, and print images of U.S. patents; (4) help examiners classify patents; and (5) support on-demand printing of copies of patents.

In reporting on APS more than 10 years following its inception, we noted that USPTO had deployed and was operating and maintaining certain parts of the system, supporting text search, limited document imaging, order-entry and patent printing, and classification activities.[11] However, our report raised concerns about the agency's ability to adequately plan and manage this major project, pointing out that its processes for exercising effective management control over APS were weak. Ultimately, USPTO never fully developed and deployed APS to achieve the integrated, end-to-end patent processing system that it envisioned. The agency reported

[9]A proposed invention is patentable if it is a new or useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.

[10]To keep the patent active, the patentee must pay maintenance fees at 3.5 years, 7.5 years, and 11.5 years.

[11]GAO, *Patent and Trademark Office: Key Processes for Managing Automated Patent System Development Are Weak*, GAO/AIMD-93-15 (Washington, D.C.: Sept. 30, 1993).

spending approximately $1 billion on this initiative from 1983 through 2002.[12]

In addition, in 1998, the agency implemented an Internet-based electronic filing system at a reported cost of $10 million, enabling applicants to submit their applications online. Further, through 2002, the agency continued to enhance its capabilities that enabled examiners to search patent images and text, and upgraded its patent application classification and tracking systems.[13]

To help the agency address the challenges of reviewing an increased volume of more complex patent applications and of reducing the length of time it takes to process them, Congress passed a law requiring USPTO to improve patent quality, implement electronic government, and reduce pendency.[14] In response to the law, in June 2002, the agency embarked on an aggressive 5-year modernization plan outlined in its 21st Century Strategic Plan, which was updated to include stakeholder input and re-released in February 2003. The strategic plan outlines 38 initiatives related to the patent organization that focus on three crosscutting strategic themes: capability, productivity, and agility. The capability theme focuses on efforts to enhance patent quality through workforce and process improvements; the productivity theme focuses on efforts to decrease the pendency of patent applications; and the agility theme focuses on initiatives to electronically process patent applications. To fully fund the initiatives in its strategic plan, the agency requested authority from Congress to increase the user fees it collects from applicants and to spend all of these fees on patent processing.[15] Legislation enacted in December

[12]The reported cost included system enhancements and maintenance through the end of the project's life cycle in 2002.

[13]The initial deployment of USPTO's patent tracking system occurred in 1980. This system provides workflow tracking, status reporting, and examiner production information.

[14]Patent and Trademark Office Authorization Act of 2002, Pub. L. No. 107-273, § 13104, 116 Stat. 1899, 1900.

[15]USPTO is authorized to collect fees from the public for specific activities related to processing applications. The spending of those fees is subject to provisions in annual appropriations acts at the discretion of the Congress.

2004 increased the fees available to USPTO; [16] however, the increases are only effective for fiscal years 2005 and 2006.

USPTO Continues to Pursue a Fully Automated Patent Process, but Has Not Effectively Managed its Strategy for Achieving This Capability

As was its intent with APS, USPTO has continued to pursue a paperless, end-to-end, automated patent process. In 2001, the agency initiated its Tools for Electronic Application Management (TEAM) automation project, aiming to deliver an end-to-end capability to process patent applications electronically by fiscal year 2006. Under the TEAM concept, the agency had planned to integrate its existing electronic filing system and the classification and search capabilities from the earlier APS project with new document management and workflow capabilities, and with image- and text-based processing[17] of patent applications to achieve a sophisticated means of handling documents and tracking patent applications throughout the examination process. By implementing image- and text-based capabilities, the agency had anticipated that patent examiners would be able to view and process applications online, as well as manipulate and annotate text within a patent application, thus eliminating manual functions and improving processing accuracy, reliability, and productivity, as well as the quality of the patents that are granted.

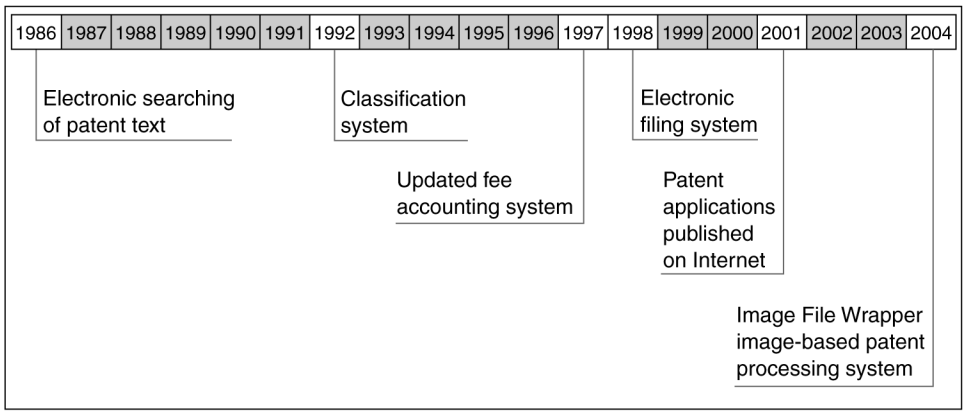
With the issuance of its 21st Century Strategic Plan, however, USPTO altered its approach to accomplishing patent automation. The strategic plan, among other things, identified the agency's high-level information technology goals for fully automating the patent process as part of the 5-year modernization effort. It incorporated automation concepts from the TEAM project, but announced an accelerated goal of delivering an operational system to electronically process patent applications by October 1, 2004, earlier than had been scheduled under TEAM.

[16]Consolidated Appropriations Act, 2005, § 801, Pub. L. No. 108-447, 118 Stat. 2809, 2924 (Dec. 8, 2004).

[17]*Image-based processing* uses a graphic representation of documents produced by scanning paper documents or by converting electronic documents into images. To transform image content into text, optical character recognition (OCR) software is used to derive text from the image. OCR can convert image documents to hidden text, which is searchable. In *text-based processing*, the words and sentences in the document are retained as text and can be stored, processed, and retrieved by a document management system. Unlike image-based processing, text-based processing allows the text to be searched and extracted.

In carrying out its patent automation plans, USPTO has delivered a number of important processing capabilities through the various information systems that it has implemented. For example, an automated search capability, available since 1986, has eliminated the need for patent examiners to manually search for prior art in paper files, and the classification and fee accounting capabilities have facilitated assigning applications to the correct subject areas and managing collections of applicable fees. In addition, the electronic filing system that has existed since 1998 has enabled applicants to file their applications with the agency via the Internet. Using the Internet, patent applicants also can review the status of their applications online and the public can electronically access and search existing published patents. Further, an imaging system implemented in August 2004, called the Image File Wrapper, has given USPTO the capability to scan patent applications and related documents, which can then be stored in a database and retrieved and reviewed online. The agency's progress in implementing its automated patent functions is illustrated in figure 1.

Figure 1: USPTO's Patent Automation Progress



Source: USPTO.

Nonetheless, even with the progress that has been made, collectively, these automated functions have not provided the fully integrated, electronic patent processing capability articulated in the agency's automation plans. Two of the key systems that it is relying on to further enhance its capabilities—the electronic filing system and the Image File Wrapper—have not yielded the processing improvements that the agency has deemed essential to successfully operate in a fully integrated, electronic environment.

Specifically, in implementing its electronic filing system, USPTO had projected significant increases in processing efficiencies and quality by providing patent applicants the capability to file online, thus alleviating the need for them to send paper applications to the agency or for patent office staff to manually key application data into the various processing systems. However, even after enhancements in 2002 and 2004, the system did not produce the level of usage among patent filers that the agency had anticipated. For example, although USPTO's preliminary justification for acquiring the electronic filing system had projected an estimated usage rate of 30 percent in fiscal year 2004, patent officials reported that, as of April 2005, fewer than 2 percent of all patent applications were being submitted to the agency via this system. As a result, anticipated processing efficiencies and quality improvements through eliminating the manual re-keying of application data have not been realized.

In September 2004, USPTO convened a forum of senior officials representing the largest U.S. corporate and patent law firm filers to identify causes of patent applicants' dissatisfaction with the electronic filing system and determine how to increase the number of patents being filed electronically. According to the report resulting from this forum, the majority of participants viewed the system as cumbersome, time-consuming, costly, inherently risky, and lacking a business case to justify its usage. Among the barriers to system usage that the participants specifically identified were (1) users' lack of a perceived benefit from filing applications electronically, (2) liability concerns associated with filers' unsuccessful use of the system or unsuccessful transmission of patent applications to USPTO, and (3) significant disruptions to filers' normal office/corporate processes and workflow caused by factors such as difficulty in using the automated tools and the inability to download necessary software through firewalls.

Several concerns raised during the forum mirrored those that USPTO had earlier identified in a 1997 analysis of a prototype for electronic filing. However, at the time of our review, the agency had not completed plans to show how it would address the concerns regarding use of the electronic filing system.

The agency's Image File Wrapper also had not resulted in critical patent processing improvements. The system includes image technology for storage and maintenance of records associated with patent applications and provides the capability to scan each page of a submitted paper application and convert the pages into electronic images. Patent examiners in a majority of the focus groups that we conducted

commented that the system had provided them with the ability to easily access patent applications and related information. In addition, patent officials stated that the system had enabled multiple users to simultaneously access patent applications.

Nonetheless, patent officials acknowledged that the system had experienced performance and usability problems. Specifically, in speaking about the system's performance, the officials and agency documentation stated that, after its implementation, the Image File Wrapper had been unavailable for extended periods of time or had experienced slow response times, resulting in decreased productivity. To lessen the impact of this problem, patent officials said they had developed a backup tool to store images of an examiner's most recent applications, which can be accessed when the Image File Wrapper is not available. Further, in commenting on this matter, the USPTO director stated that the system's performance had begun to show improvement.

Regarding the usability of the system, patent officials and focus group results indicated that the Image File Wrapper did not fully meet processing needs. For example, the officials stated that, as an image-based system, the Image File Wrapper did not fully enable patent examiners to electronically search, manipulate, or track and log changes to application text, which were key processing features emphasized in the agency's automation plans. The examiners also commented that a limited capability to convert images to text, which was intended to assist them in copying and reusing information contained in patent files, was error-prone, contributing to their need to download and print the applications for review. Further, because the office's legacy systems were not integrated with the Image File Wrapper, examiners were required to manually print correspondence from these systems, which then had to be scanned into the Image File Wrapper in order to be included as part of an applicant's electronic file.

Patent and Office of Chief Information Officer (OCIO) officials largely attributed the system's performance and usability problems to the agency's use of software that it acquired from the European Patent Office. The officials explained that, to meet the accelerated date for delivering an operational system as outlined in its strategic plan, the agency had decided in 2002 to acquire and use a document-imaging system owned by the European Patent Office, called ePhoenix, rather than develop the

integrated patent processing system that had been described in its automation plans.[18] According to the officials, the director, at that time, had considered ePhoenix to be the most appropriate solution for further implementing USPTO's electronic patent processing capabilities given (1) pressures from Congress and from customers and stakeholders to implement an electronic patent processing system more quickly than originally planned and (2) the agency's impending move to its new facility in Alexandria, Virginia, which did not include provisions for transferring and storing paper patent applications.[19]

However, they indicated that the original design of the ePhoenix system had not been compatible with USPTO's technical platform for electronic patent processing. Specifically, they stated that the European Patent Office had designed the system to support only the printing of files for subsequent manual reviews, rather than for electronic review and processing. In addition, they stated that the system had not been designed for integration with other legacy systems or to incorporate additional capabilities, such as text processing, with the existing imaging capability. Further, an official of the European Patent Office noted that ePhoenix had supported their office's much smaller volume of patent applications.[20] Thus, with USPTO's patent application workload being approximately twice as large as that of its European counterpart, the agency placed greater stress on the system than it was originally designed to accommodate. OCIO officials told us that, although they had tested certain aspects of the system's capability, many of the problems encountered in using the system were not revealed until after the system was deployed and operational.

Patent and OCIO officials acknowledged that the agency had purchased ePhoenix although senior officials were aware that the original design of the system had not been compatible with USPTO's technological platform

[18]In November 2002, patent officials entered into an agreement with the European Patent Office, in which that office agreed to provide USPTO with a license to use its patent processing software and to provide technical assistance in customizing the software to meet USPTO's needs. USPTO completed its implementation of the system in August 2004, at a reported total cost of approximately $14 million.

[19]In December 2003, USPTO began relocating its headquarters from Arlington (Crystal City), Virginia, to Alexandria, Virginia, with the intent of consolidating all of its major operations in a central facility. The agency completed this move in July 2005.

[20]Over the past 2 years, the European Patent Office reported processing about 160,000 to 170,000 patents per year using ePhoenix.

for electronic patent processing. They stated that, despite knowing about the problems and risks associated with using the software, the agency had nonetheless proceeded with this initiative because senior officials, including the former USPTO director, had stressed their preference for using ePhoenix in order to expedite the implementation of a system. Patent and OCIO officials acknowledged that management judgment, rather than a rigorous analysis of costs, benefits, and alternatives, had driven the agency's decision to use this system.

To a significant extent, USPTO's difficulty in realizing intended improvements through its electronic filing system and Image File Wrapper can be attributed to the fact that the agency took an ad hoc approach to planning and managing its implementation of these systems, driven in part by its accelerated schedule for implementing an automated patent processing capability. The Clinger-Cohen Act of 1996,[21] as well as information technology best practices and our prior reviews, emphasize the need for agencies to undertake information technology projects based on well-established business cases that articulate agreed-upon business and technical requirements; effectively analyze project alternatives, costs, and benefits; include measures for tracking projects through their life cycle against cost, schedule, benefit, and performance targets; and ultimately, provide the basis for credible and informed decision making and project management. Yet, patent officials did not rely on established business cases to guide their implementation of these key automation initiatives.

The absence of sound project planning and management for these initiatives has left the agency without critical capabilities, such as text processing, and consequently, has impeded its successful transition to an integrated and paperless patent processing environment. The Under Secretary of Commerce for Intellectual Property, who serves as the director of USPTO, stated at the conclusion of our review that he recognized and intended to implement measures to address the weaknesses in the agency's planning and management of its automated patent systems.

[21] 40 U.SC. §11312.

USPTO Lacks Essential Information Technology Investment Management Processes to Support Its Patent Automation

USPTO's ineffective planning for and management of its patent automation projects, in large measure, can be attributed to enterprise-level, systemic weaknesses in the agency's information technology investment management processes. A key requirement of the Clinger-Cohen Act is that agencies have established processes, such as capital planning and investment control, to help ensure that information technology projects are implemented at acceptable costs and within reasonable and expected time frames, and contribute to tangible, observable improvements in mission performance. Such processes guide the selection, management, and evaluation of information technology investments by aiding management in considering whether to undertake a particular investment in information systems and providing a means to obtain necessary information regarding the progress of an investment in terms of cost, capability of the system to meet specified requirements, timeliness, and quality.

Further, our Enterprise Architecture Framework[22] emphasizes that information technology projects should show evidence of compliance with the organization's enterprise architecture, which serves as a blueprint for systematically and completely defining an organization's current (baseline) operational and technology environment and as a roadmap toward the desired (target) state. Effective implementation of an enterprise architecture can facilitate an agency by informing, guiding, and constraining the decisions being made for the agency, and subsequently decrease the risk of buying and building systems that are duplicative, incompatible, and unnecessarily costly to maintain and interface.

At the time of our study, USPTO had begun instituting certain essential information technology investment management mechanisms, such as a framework for its enterprise architecture and components of a capital planning and investment control process. However, it had not yet established the necessary linkages between its enterprise architecture and its capital planning and investment control process to ensure that its automation projects would comply with the architecture or fully instituted enforcement mechanisms for investment management. For example, USPTO drafted a capital planning and investment control guide in June 2004 and issued an agency administrative order on its integrated

[22]For more information, see GAO, *Information Technology: A Framework for Assessing and Improving Enterprise Architecture Management* (Version 1.1), GAO-03-584G (Washington, D.C.: April 2003).

investment decision practices in February 2005. However, according to senior officials, many of the processes and procedures in the guide had not been completed and fully implemented and it was unclear how the agency administrative order was being applied to investments.

In addition, while the agency had completed the framework for its enterprise architecture, it had not aligned its business processes and information technology in accordance with the architecture. According to OCIO officials, the architecture review board responsible for enforcing compliance with the architecture was not yet in place; thus, current architecture reviews were of an advisory nature and were not required for system implementation. Our analysis of architecture review documents that system officials provided for the electronic filing system and the Image File Wrapper confirmed that the agency had not rigorously assessed either of these systems' compliance with the enterprise architecture. Adding to these conditions, a study commissioned by the agency in 2004 found that its Office of Chief Information Officer was not organized to help the agency accomplish the goals in its automation strategy and that its investment management processes did not ensure appropriate reviews of automation initiatives.

USPTO has an explicit responsibility to ensure that the automation initiatives that it is counting on to enhance its overall patent process are consistent with the agency's priorities and needs and are supported by the necessary planning and management to successfully accomplish this. At the conclusion of our review, the agency's director and its chief information officer acknowledged the need to strengthen the agency's investment management processes and practices and to effectively apply them to USPTO's patent automation initiatives.

USPTO Has Taken Steps to Help Attract and Retain a Qualified Patent Examiner Workforce, but Long-Term Success Is Uncertain

Since 2000, USPTO has also taken steps intended to help attract and retain a qualified patent examination workforce. The agency has enhanced its recruiting efforts and has used many human capital flexibilities to attract and retain qualified patent examiners. However, during the past 5 years, its recruiting efforts and use of benefits have not been consistently sustained, and officials and examiners at all levels in the agency told us that the economy has more of an impact on their ability to attract and retain examiners than any actions taken by the agency. Consequently, how USPTO's actions will affect its long-term ability to maintain a highly qualified workforce is unclear. While the agency has been able to meet its hiring goals, attrition has recently increased.

USPTO's recent recruiting efforts have incorporated several measures that we and others identified as necessary to attract a qualified workforce.[23] First, in 2003, to help select qualified applicants, the agency identified the knowledge, skills, and abilities that examiners need to effectively fulfill their responsibilities. Second, in 2004, its permanent recruiting team, composed of senior and line managers,[24] participated in various recruiting events, such as job fairs, conferences sponsored by professional societies, and visits to the 10 schools that the agency targeted based on the diversity of their student population and the strength of their engineering and science programs.[25] Finally, for 2005, USPTO developed a formal recruiting plan that, among other things, identified hiring goals for each technology center and described the agency's efforts to establish ongoing partnerships with the 10 target schools. In addition, the agency trained its recruiters in effective interviewing techniques to help them better describe the production system and incorporated references to the production-oriented work environment in its recruitment literature.

USPTO has also used many of the human capital benefits available under federal personnel regulations to attract and retain qualified patent examiners. Among other benefits, it has offered

- recruitment bonuses ranging from $600 to over $10,000;
- a special pay rate for patent examiners that is 10 percent above federal salaries for comparable jobs;
- non-competitive promotion to the full performance level; and
- flexible working schedules, including the ability to schedule hours off during midday.

[23]See GAO, *Human Capital: A Self-Assessment Checklist for Agency Leaders*, GAO/OCG-00-14G, version 1 (Washington, D.C.: September 2000); and Office of Personnel Management, *Human Capital Assessment Accountability Framework*, (Washington, D.C., Sept. 20, 2000).

[24]USPTO's permanent recruiting team was established in 2002. However, the agency suspended recruiting efforts in 2002 and 2003 in the face of budgetary uncertainty.

[25]The 10 target schools selected were Florida International University, North Carolina Agricultural and Technical State University, North Carolina State University, University of Florida, University of Maryland, University of Pennsylvania, University of Puerto Rico-Mayaguez, University of Virginia, University of Wisconsin-Madison, and Virginia Polytechnic and State University.

According to many of the supervisors and examiners who participated in our focus groups, these benefits were a key reason they were attracted to the agency and are a reason they continue to stay. The benefits that examiners most frequently cited as important were the flexible working schedules and competitive salaries.

However, it is too soon to determine the long-term effect of the agency's efforts, in part because neither its recruiting efforts nor the human capital benefits have been consistently sustained due to budgetary constraints. For example, in 2002 the agency suspended reimbursements to examiners for law school tuition because of funding limitations, although it resumed the reimbursements in 2004 when funding became available. Examiners in our focus groups expressed dissatisfaction with the inconsistent availability of these benefits, in some cases saying that the suspension of benefits, such as law school tuition reimbursement, provided them an incentive to leave the agency. More recently, in March 2005, USPTO proposed to eliminate or modify other benefits, such as the ability of examiners to earn credit hours and to set their own work schedules.

Another, and possibly the most important, factor adding to the uncertainty of USPTO's recruiting efforts is the unknown potential impact of the economy, which, according to agency officials and examiners, has a greater effect on recruitment and retention than any actions the agency may take. Both agency officials and examiners told us that when the economy picks up, more examiners tend to leave the agency and fewer qualified candidates are attracted to it. On the other hand, when there is a downturn in the economy, the agency's ability to attract and retain qualified examiners increases because of perceived job security and competitive pay. When discussing their reasons for joining USPTO, many examiners in our focus groups cited job security and the lack of other employment opportunities, making comments such as, "I had been laid off from my prior job, and this was the only job offer I got at the time." This relationship between the economy and USPTO's hiring and retention success is part of the reason why the agency has met its hiring goals for the last several years. However, the agency has recently experienced a rise in attrition rates. In particular, a high level of attrition among younger, less experienced examiners could affect its efforts to maintain a highly qualified patent examination workforce. Attrition of examiners with 3 years or less experience is a significant loss for the agency because considerable time and dollar resources are invested to help new examiners become proficient during their first few years.

USPTO Faces Long-Standing Human Capital Challenges that Could Undermine Its Recruiting and Retention Efforts

While USPTO has undertaken a number of important and necessary actions to attract and retain qualified patent examiners, it continues to face three long-standing human capital challenges which, if not addressed, could also undermine its recent efforts. First, although organizations with effective human capital models have strategies to communicate with employees and involve them in decision making, the lack of good communication and collaboration has been a long-standing problem at USPTO. We found that the agency does not have a formal communication strategy and does not actively seek input from examiners on key management decisions. Most of the emphasis is on enhanced communication among managers but not between managers and other levels of the organization, such as patent examiners. Patent examiners and supervisory patent examiners in our focus groups frequently stated that communication with agency management was poor and that managers provided them with inadequate or no information, creating an atmosphere of distrust of management. The examiners also said that management was out of touch with them and their concerns and that communication with the managers tended to be one way and hierarchical, with little opportunity for feedback. Management officials told us that informal feedback can always be provided by anyone in the organization—for example, through an e-mail to anyone in management.

The lack of communication between management and examiners is exacerbated by the contentious working relationship between management and union officials and by the complexity of the rules about what level of communication can occur between managers and examiners without involving the union.[26] Some managers alluded to this contentious relationship as one of the reasons why they had limited communication with patent examiners, who are represented by the union even if they decide not to join it. Specifically, they believed they could not solicit the input of employees directly without engaging the union. Another official, however, told us that nothing prevents the agency from having "town hall" type meetings to discuss potential changes in policies and procedures, as long as the agency does not promise examiners a benefit that impacts their working conditions. Union officials agreed that USPTO can invite comments from examiners on a plan or proposal; however, if the proposal concerns a negotiating issue, the agency must consult the examiners'

[26]Patent examiners are represented by, but not required to join, the Patent Office Professional Association (POPA), an independent union of professional employees formed in 1964.

union, which is their exclusive representative with regard to working conditions.

Second, human capital models suggest that agencies should periodically assess their monetary awards systems to ensure that they help attract and retain qualified staff. However, patent examiners' awards are based largely on the number of applications they process, and the assumptions on which application processing quotas are based have not been updated since 1976. Patent examiners and management have differing opinions on whether these assumptions need to be updated. Examiners in our focus groups told us that, in the last several decades, the tasks associated with and the complexity of processing applications have greatly increased while the time allowed has not. As a result, many of the examiners and supervisory patent examiners in our focus groups and respondents to previous agency surveys reported that examiners do not have enough time to conduct high-quality reviews of patent applications. The examiners noted that these inadequate time frames create a stressful work environment and are cited in the agency's exit surveys as a primary reason that examiners leave the agency. In contrast, USPTO managers had a different perspective on the production model and its impact on examiners. They stated that the time estimates used in establishing production quotas do not need to be adjusted because the efficiencies gained through actions such as the greater use of technology have offset the time needed to address the greater complexity of the applications and the increase in the number of claims. Moreover, they said that for an individual examiner, reviews of applications that take more time than the estimated average are generally offset by other reviews that take less time.

Finally, counter to current workforce models, USPTO does not require ongoing technical education for patent examiners, which could negatively affect the quality of its patent examination workforce. Instead, the agency requires newly hired examiners to take extensive training only during their first year of employment; all subsequent required training is focused on developing legal expertise. Almost all patent examiners are required to take a range of ongoing training in legal matters, including patent law. In contrast, patent examiners are not required to undertake any ongoing training to maintain expertise in their area of technology, even though the agency acknowledges that such training is important, especially for electrical and electronic engineers. In 2001 the agency stated, "Engineers who fail to keep up with the rapid changes in technology, regardless of degree, risk technological obsolescence." However, agency officials told us that examiners automatically maintain currency with their technical fields by just doing their job. Patent examiners and supervisory patent

examiners disagreed, stating that the literature they review in applications is outdated, particularly in rapidly evolving technologies. The agency does offer some voluntary in-house training, such as technology fairs and industry days at which scientists and others are invited to present lectures to patent examiners that will help keep them current on the technical aspects of their work. In addition, the agency offers voluntary external training and, for a small number of examiners, pays conference or workshop registration fees. Agency officials could provide no data on the extent to which examiners have taken advantage of such training opportunities.

USPTO Has Made Greater Progress on Strategic Plan Initiatives that Enhance the Agency's Capability Rather than Productivity and Agility

In carrying out its strategic plan to become a more productive and responsive organization, our work found that USPTO has made greater progress in implementing its initiatives to make the patent organization more capable by improving the quality of examiners' skills and work processes than it has in implementing its productivity and agility initiatives aimed at decreasing the length of time to process a patent application and improving electronic processing. Specifically, of the activities planned for completion by December 2004, the agency has fully or partially implemented all 23 of the initiatives related to its capability theme to improve the skills of employees, enhance quality assurance, and alter the patent process through legislative and rule changes. In contrast, it has partially implemented only 1 of the 4 initiatives related to the productivity theme to restructure fees and expand examination options for patent applicants and has fully or partially implemented 7 of the 11 initiatives related to the agility theme to increase electronic processing of patent applications and to reduce examiners' responsibilities for literature searches. Table 1 provides our assessment of each of the strategic plan initiatives.

Table 1: Status of Strategic Plan Initiatives to Improve Workforce Skills

Capability initiatives to improve workforce skills	Implemented	Partially implemented	Not implemented
Increase the pool of qualified management candidates by adding awards to total compensation	•		
Explore alternate organizational structures for the workplace	•		
Develop interim pre-employment measures to assess English language skills	•		
Recertify the skills of examiners with authority to issue patents (primary examiners) through examinations and expanded work product reviews	•		
Certify that examiners possess the requisite knowledge, skills, and abilities prior to promotion to a position with authority to negotiate on behalf of USPTO	•		
Improve the selection and training of supervisory patent examiners		•	
Use examinations and other means to ensure that new patent examiners possess the requisite skills prior to promotion		•	
Implement a pre-employment test to assess English language skills		•	
Create an Enterprise Training Division		•	
Capability initiatives to enhance quality assurance			
Expand current quality assurance program to include works in progress (in-process reviews)	•		
Establish “second pair of eyes” reviews in each technology center	•		
Survey customer regarding transactions with USPTO on specific applications to supplement comprehensive customer surveys	•		
Evaluate the quality of examiners’ literature searches		•	
Enhance the reviewable record for each patent application with additional information from the applicant and examiner		•	
Capability initiatives to change legislation and rules			
Delete the requirement for physical surrender of the original patent papers	•		
Certify the legal knowledge of patent attorneys and agents who wish to practice before USPTO and periodically recertify the skills of practicing attorneys and agents		•	
Evaluate whether to adopt a unity of invention standard		•	
Simplify adjustments to the patent term		•	
Permit individuals who have been assigned patent rights to sign an oath declaring that the inventor is the original and first inventor		•	
Permit individuals who have been assigned patent rights to broaden the claims in an application		•	
Correct an inconsistency regarding unintentionally delayed submission of certain claims		•	
Eliminate certain exemptions from the requirement to publish most patent applications within 18 months of when they were first filed		•	

Amend current legislation regarding certain limitations on an inventor's right to obtain a patent		•	
Productivity initiatives			
Restructure fees and provide for refunds		•	
Offer patent applicants a choice of up to 5 examination options based in part on the ability to rely on searches conducted by others			•
Offer patent applicants the option of an accelerated examination			•
Revise postgrant review procedures to allow greater public input			•
Agility initiatives			
Establish an information security program	•		
Transition to electronic patent processing		•	
Transition to electronic processing for postgrant reviews		•	
Ensure availability of critical data in the event of a catastrophic systems failure		•	
Promote international harmonization and pursue goals to strengthen international intellectual property rights of U.S. inventors		•	
Pursue international agreements to share patent search results		•	
Accelerate Patent Cooperation Treaty reforms		•	
Rely on other sources to classify patent documents			•
Rely on other sources to support domestic and international literature searches			•
Rely on other sources to transition to a new global patent classification system			•
Develop stringent conflict of interest clauses for search firms			•

Source: GAO analysis of USPTO data.

Agency officials primarily cited the need for additional funding as the main reason that some initiatives have not been implemented. With passage of the legislation in December 2004 to restructure and increase the fees available to USPTO, the agency is reevaluating the feasibility of many initiatives that it had deferred or suspended.

In summary, through its attempts to implement an integrated, paperless patent process over the past two decades, USPTO has delivered a number of important automated capabilities. Nonetheless, after spending over a billion dollars on its efforts, the agency is still not yet effectively positioned to process patent applications in a fully automated environment. Moreover, when and how it will actually achieve this capability is uncertain. Largely as a result of ineffective planning and management of its automated capabilities, system performance and usability problems have limited the effectiveness of key systems that the agency has implemented to support critical patent processes. Although

USPTO's director and its chief information officer have recognized the need to improve the agency's planning and management of its automation initiatives, weaknesses in key information technology management processes needed to guide the agency's investments in patent automation, such as incomplete capital planning and investment controls, could preclude their ability to successfully accomplish this. Thus, the agency risks further implementing information technology that does not support its needs and that threatens its overall goal of achieving a fully electronic capability to process its growing patent application workload.

Further, to improve its ability to attract and retain the highly educated and qualified patent examiners it needs, USPTO has taken steps recognized by experts as characteristic of highly effective organizations. However, without an effective communication strategy and a collaborative culture that includes all layers of the organization, the agency's efforts could be undermined. The absence of effective communication and collaboration has created distrust and a significant divide between management and examiners on important issues such as the appropriateness of the production model and the need for technical training. Unless the agency begins to develop an open, transparent, and collaborative work environment, its efforts to hire and retain examiners may be adversely affected in the long run. Overall, while USPTO has progressed in implementing strategic plan initiatives aimed at improving its organizational capability, the agency attributes its limited implementation of other initiatives intended to reduce pendency and improve electronic patent application processing primarily to the need for additional funding.

Given the weaknesses in USPTO's information technology investment management processes, we recommended that the agency, before proceeding with any new patent automation initiatives, (1) reassess and, where necessary, revise its approach for implementing and achieving effective use of information systems supporting a fully automated patent process; (2) establish disciplined processes for planning and managing the development of patent systems based on well-established business cases; and (3) fully institute and enforce information technology investment management processes and practices to ensure that its automation initiatives support the agency's mission and are aligned with its enterprise architecture. Further, in light of its need for a more transparent and collaborative work environment, we recommended that the agency develop formal strategies to (1) improve communication between management and patent examiners and between management and union officials and (2) foster greater collaboration among all levels of the

organization to resolve key issues, such as the assumptions underlying the quota system and the need for required technical training.

USPTO generally agreed with our findings, conclusions, and recommendations regarding its patent automation initiatives and acknowledged the need for improvements in its management processes by, for example, developing architectural linkages to the planning process and implementing a capital planning and investment control guide. Nonetheless, the agency stated that it only partially agreed with several material aspects of our assessment, including our recommendation that it reassess its approach to automating its patent process. Further, the agency generally agreed with our findings, conclusions, and recommendations regarding its workforce collaboration and suggested that it would develop a communication plan and labor management strategy, and educate and inform employees about progress on initiatives, successes, and lessons learned. In addition, USPTO indicated that it would develop a more formalized technical program for patent examiners to ensure that their skills are fresh and ready to address state-of-the-art technology.

Mr. Chairman, this concludes our statement. We would be pleased to respond to any questions that you or other Members of the Committee may have at this time.

Contacts and Acknowledgments

For further information, please contact Anu K. Mittal at (202) 512-3841or Linda D. Koontz at (202) 512-6240. They can also be reached by e-mail at mittala@gao.gov and koontzl@gao.gov, respectively. Other individuals making significant contributions to this testimony were Valerie C. Melvin, Assistant Director; Cheryl Williams, Assistant Director; Mary J. Dorsey, Vijay D'Souza, Nancy Glover, Vondalee R. Hunt, and Alison D. O'Neill.

GAO's Mission

The Government Accountability Office, the audit, evaluation and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's Web site (www.gao.gov). Each weekday, GAO posts newly released reports, testimony, and correspondence on its Web site. To have GAO e-mail you a list of newly posted products every afternoon, go to www.gao.gov and select "Subscribe to Updates."

Order by Mail or Phone

The first copy of each printed report is free. Additional copies are $2 each. A check or money order should be made out to the Superintendent of Documents. GAO also accepts VISA and Mastercard. Orders for 100 or more copies mailed to a single address are discounted 25 percent. Orders should be sent to:

U.S. Government Accountability Office
441 G Street NW, Room LM
Washington, D.C. 20548

To order by Phone: Voice: (202) 512-6000
TDD: (202) 512-2537
Fax: (202) 512-6061

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm
E-mail: fraudnet@gao.gov
Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Gloria Jarmon, Managing Director, JarmonG@gao.gov (202) 512-4400
U.S. Government Accountability Office, 441 G Street NW, Room 7125
Washington, D.C. 20548

Public Affairs

Paul Anderson, Managing Director, AndersonP1@gao.gov (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, D.C. 20548

Attachment

United States Government Accountability Office

GAO

Report to Congressional Committees

June 2005

INTELLECTUAL PROPERTY

USPTO Has Made Progress in Hiring Examiners, but Challenges to Retention Remain

GAO-05-720

June 2005

INTELLECTUAL PROPERTY

USPTO Has Made Progress in Hiring Examiners, but Challenges to Retention Remain

GAO Accountability·Integrity·Reliability

Highlights

Highlights of GAO-05-720, a report to congressional committees

Why GAO Did This Study

The U.S. Patent and Trademark Office (USPTO) is responsible for issuing U.S. patents that protect new ideas and investments in innovation and creativity. Recent increases in both the complexity and volume of patent applications have increased the time it takes to process patents and have raised concerns about the validity of the patents USPTO issues. Adding to these challenges is the difficulty that USPTO has had attracting and retaining qualified staff. In this context, GAO was asked to obtain information about USPTO's patent organization. Specifically GAO reviewed (1) overall progress in implementing the initiatives in its strategic plan; (2) efforts to attract and retain a qualified patent workforce; and (3) remaining challenges, if any, in attracting and retaining a qualified patent workforce.

What GAO Recommends

GAO recommends that USPTO develop formal strategies to improve communication and collaboration between management, patent examiners, and the union to help to address the issues identified in this report. USPTO agreed with our recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-05-720.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Anu K. Mittal at (202) 512-3841 or mittala@gao.gov.

What GAO Found

USPTO has made more progress in implementing its strategic plan initiatives to increase the agency's capability than initiatives aimed at decreasing patent pendency. USPTO has fully or partially implemented all 23 capability initiatives that focus on improving the skills of employees, enhancing quality assurance, and altering the patent system through changes in existing laws or regulations. In contrast, the agency has partially or fully implemented only 8 of the 15 initiatives aimed at reducing pendency. Lack of funding was cited as the primary reason for not implementing these initiatives. With passage of legislation in December 2004 to increase fees available to USPTO for the next two years, the agency is re-evaluating the feasibility of implementing some of these initiatives.

Since 2000, USPTO has taken steps intended to help attract and retain a qualified patent examination workforce, such as enhancing its recruiting efforts and using many of the human capital benefits available under federal personnel regulations. However, it is too soon to determine the long-term success of the agency's recruiting efforts because they have been in place only a short time and have not been consistently sustained due to budgetary constraints. Long-term uncertainty about USPTO's hiring and retention success is also due to the unknown impact of the economy. In the past, when the economy was doing well, the agency had more difficulty in recruiting and retaining the staff it needed.

USPTO faces three long-standing challenges that could also undermine its efforts to retain a qualified workforce: the lack of an effective strategy to communicate and collaborate with examiners; outdated assumptions in the production quotas it uses to reward examiners; and the lack of required ongoing technical training for examiners. According to patent examiners, the lack of communication and a collaborative work environment has resulted in low morale and an atmosphere of distrust that is exacerbated by the contentious relationship between management and union officials. Also, managers and examiners have differing opinions on the need to update the monetary award system that is based on assumptions that were established in 1976. As a result, examiners told us they have to contend with a highly stressful work environment and work voluntary overtime to meet their assigned quotas. Similarly, managers and examiners disagree on the need for required ongoing technical training. Examiners said they need this training to keep current in their technical fields, while managers believe that reviewing patent applications is the best way for examiners to remain current.

Contents

Letter 1

Results in Brief 3
Background 6
USPTO Has Made Greater Progress on Strategic Plan Initiatives That Enhance the Agency's Capability Rather Than Productivity and Agility 9
USPTO Has Taken Steps to Help Attract and Retain a Qualified Patent Examiner Workforce, but Long-Term Success Is Uncertain 16
USPTO Faces Long-standing Human Capital Challenges That Could Undermine Its Recruiting and Retention Efforts 24
Conclusions 32
Recommendations for Executive Action 32
Agency Comments and Our Evaluation 32

Appendixes

Appendix I: Scope and Methodology 34
Appendix II: Comments from the U.S. Patent and Trademark Office 36
Appendix III: Progress on Strategic Plan Initiatives 40
Appendix IV: GAO Contact and Staff Acknowledgments 50

Tables

Table 1: USPTO Average Patent Pendency by Technology Center, 2004 8
Table 2: Status of Capability Initiatives to Improve Workforce Skills 10
Table 3: Status of Capability Initiatives to Enhance Quality Assurance 11
Table 4: Status of Capability Initiatives to Change Legislation and Rules 12
Table 5: Status of Productivity Initiatives 13
Table 6: Status of Agility Initiatives 14
Table 7: USPTO Patent Examiner Hiring Data, Fiscal Years 2000–2004 22
Table 8: USPTO Capability Initiatives 40
Table 9: USPTO Productivity Initiatives 45
Table 10: USPTO Agility Initiatives 47

Figures

Figure 1: USPTO's 2004 Brand Image 18

Figure 2: USPTO's 2002 Brand Image 19
Figure 3: Examiner Attrition as Percentage of Staff 23

Abbreviations

EPO	European Patent Office
OIG	Office of Inspector General
OMB	Office of Management and Budget
OPM	Office of Personnel Management
OPQA	Office of Patent Quality Assurance
PCT	Patent Cooperation Treaty
POPA	Patent Office Professional Association
USPTO	U.S. Patent and Trademark Office

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, D.C. 20548

June 17, 2005

The Honorable F. James Sensenbrenner Jr.
Chairman
Committee on the Judiciary
House of Representatives

The Honorable Frank R. Wolf
Chairman
Subcommittee on Science, the Departments
of State, Justice, and Commerce, and
Related Agencies
Committee on Appropriations
House of Representatives

The U.S. Patent and Trademark Office (USPTO) is responsible for issuing U.S. patents that protect new ideas and investments in innovation and creativity.[1] However, recent increases in both the complexity and volume of patent applications have lengthened the time it takes USPTO to process patents ("pendency") and have raised concerns among intellectual property organizations, patent holders, and others about the quality of the patents that are issued. Over the last 10 years, the number of patent applications filed annually with USPTO has increased 91 percent from about 185,000 in 1994 to over 350,000 in 2004. USPTO's resources have not kept pace with the rising number and complexity of patent applications it must review. Moreover, at times, USPTO officials acknowledge they have had difficulty competing with the private sector to attract and retain staff with the high degree of scientific, technical, and legal knowledge required to be patent examiners. To help the agency address these challenges, Congress passed a law requiring USPTO to improve patent quality, implement electronic government,[2] and reduce pendency.[3]

[1]USPTO, an agency within the Department of Commerce, consists of two organizations, one for patents and one for trademarks. This report focuses on the patent organization, which accounts for about 76 percent of the agency's resources.

[2]Electronic government refers to an increased reliance on information technology to conduct government operations and accomplish agency missions.

[3]Patent and Trademark Office Authorization Act of 2002, Pub. L. No. 107-273, § 13104, 116 Stat. 1899, 1900, required USPTO to develop a 5-year strategic plan for meeting these three requirements.

In response to the law, USPTO in June 2002 embarked on an aggressive 5-year modernization plan outlined in its 21st Century Strategic Plan (Strategic Plan), which was updated to include stakeholder input and rereleased in February 2003.[4] USPTO's Strategic Plan includes 38 initiatives related to the patent organization that focus on three crosscutting strategic themes: capability, productivity, and agility. The capability theme includes efforts to enhance patent quality through workforce and process improvements; the productivity theme includes efforts to decrease pendency of patent applications; and the agility theme includes initiatives to electronically process patent applications. To fully fund the initiatives in its Strategic Plan, the agency requested authority from Congress to increase the user fees it collects from applicants and to spend all of these fees on patent processing.[5] Legislation to increase the fees was enacted in December 2004;[6] however, the changes will be effective only in fiscal years 2005 and 2006. Although USPTO's Strategic Plan includes some initiatives to improve the skills of its examination workforce, the agency's more detailed summary of its actions to attract and retain a qualified workforce is contained in the Strategic Workforce Restructuring Plan (Workforce Plan), which the agency developed in 2001.

In the context of the various efforts being undertaken by USPTO, you requested that we obtain information about its (1) overall progress in implementing the initiatives in the 21st Century Strategic Plan related to the patent organization; (2) efforts to attract and retain a qualified patent workforce; and (3) remaining challenges, if any, in attracting and retaining a qualified patent workforce.

To determine USPTO's progress toward implementing the Strategic Plan initiatives for the patent organization, we reviewed the initiatives contained in the plan, as well as agency documents regarding USPTO's progress in implementing each initiative. We also interviewed key USPTO officials and

[4]USPTO also prepared the Strategic Plan as part of the requirements of the Government Performance and Results Act.

[5]USPTO is funded by fees collected from the public for specific activities related to processing applications. The spending of those fees is subject to provisions in annual appropriations acts.

[6]Consolidated Appropriations Act, 2005, § 801, Pub. L. No. 108-447, 118 Stat. 2809, 2924 (Dec. 8, 2004).

union officials about the plan's implementation.[7] We focused our review on tasks that were to have been completed by December 2004. To determine what actions USPTO has taken to attract and retain a qualified patent workforce and what challenges, if any, the agency faces in this area, we reviewed USPTO's Workforce Plan and other policies and practices related to human capital. We interviewed USPTO management and union officials, as well as officials from the Department of Commerce, its Office of Inspector General (OIG), and the Office of Personnel Management (OPM) about human capital initiatives undertaken by USPTO. We also reviewed results from USPTO and OPM employee surveys and compared human capital policies and practices with those recommended by GAO, OPM, and others. In addition, we attended a USPTO career fair for patent examiners to observe agency recruiting efforts and conducted focus groups with patent examiners and supervisory patent examiners to obtain their views on various issues related to USPTO's ability to attract and retain a qualified patent examination workforce. Our review focused exclusively on the activities of the patent organization and not those of the trademark organization. We are issuing a separate report addressing the agency's strategy for automating its patent process.[8] Appendix I contains a detailed discussion of the scope and methodology for our review. We conducted our review from June 2004 through April 2005 in accordance with generally accepted government auditing standards.

Results in Brief

USPTO has made greater progress in implementing its Strategic Plan's initiatives to improve the patent organization's capability than it has in implementing initiatives to improve its productivity and agility. Specifically, of the actions planned to have been implemented by December 2004, USPTO has fully or partially implemented all 23 of the initiatives related to its capability theme, which focuses on improving the skills of employees, enhancing quality assurance, and altering the patent system through changes in existing laws or regulations. For example, USPTO established programs to periodically test the skills of patent examiners, and revised and expanded reviews to ensure the quality of examiners' work. In

[7]Patent examiners are represented by, but not required to join, the Patent Office Professional Association (POPA), an independent union of professional employees formed in 1964.

[8]GAO, *Intellectual Property: Key Processes for Managing Patent Automation Strategy Need Strengthening*, GAO-05-336 (Washington, D.C.: June 17, 2005).

contrast, the agency has partially implemented only 1 of the 4 initiatives related to the productivity theme to help reduce pendency, and has fully implemented only 1 and partially implemented 6 of the 11 initiatives related to the agility theme to help improve electronic processing of patent applications. Agency officials primarily cited the need for additional funding as the reason for not implementing these initiatives. With passage of the legislation in December 2004 to increase fees available to USPTO, the agency is re-evaluating the feasibility of implementing those initiatives that it had previously deferred or suspended.

Since 2000, USPTO has taken steps intended to help attract and retain a qualified patent examination workforce. Specifically, the agency enhanced its recruiting efforts by, among other things, identifying the knowledge, skills, and abilities that patent examiners need to effectively fulfill their responsibilities and establishing a permanent recruiting team composed of senior and line managers. In addition, USPTO has used many of the human capital benefits available under federal personnel regulations to attract and retain qualified examiners, including the two benefits most frequently cited as important by examiners: flexible working schedules and competitive salaries. However, it is too soon to determine the long-term success of the agency's efforts, in part because neither recruiting efforts nor availability of benefits have been consistently sustained during the limited time they have been in effect. In 2002, for example, USPTO suspended reimbursements to examiners for law school tuition, in part because of funding limitations, although the agency resumed reimbursement in 2004 when funding from the fee legislation became available. Examiners in our focus groups expressed dissatisfaction with the inconsistent availability of these benefits, in some cases saying that suspension of benefits provides them with an incentive to leave the agency. Another reason adding to the uncertainty of USPTO's recruiting efforts is the impact of the economy, which, according to agency officials and examiners, has a greater effect on recruitment and retention than any actions the agency may take. Both agency officials and examiners told us that when the economy picks up, more examiners tend to leave USPTO and fewer qualified candidates are attracted to the agency. On the other hand, when there is a downturn in the economy, USPTO's ability to attract and retain qualified examiners increases because of perceived job security and competitive pay. This correspondence between the economy and USPTO's hiring and retention success is part of the reason why USPTO has been able to meet its hiring goals for the last several years, but recently has experienced a rise in attrition rates.

While USPTO has undertaken a number of important and necessary actions to attract and retain qualified patent examiners, the agency continues to face three long-standing human capital challenges that could also undermine its recent efforts if not addressed.

- First, the agency lacks effective mechanisms for helping managers to communicate and collaborate with examiners. Organizations with effective human capital models have strategies to communicate with employees and involve them in decision making; however, USPTO officials acknowledged that they do not have a formal communication strategy or actively seek input from examiners on management decisions. Most of USPTO's communication mechanisms emphasize communication between managers and not between managers and examiners. Patent examiners and supervisory patent examiners in our focus groups frequently said that communication with management was poor or nonexistent, and they reported little involvement in providing input to key agency decisions. Prior employee surveys and participants in our focus groups indicated that the lack of communication and involvement has created an atmosphere of distrust of USPTO management and lowered examiner morale, which is further exacerbated by the contentious relationship between USPTO management and the examiners' union.

- Second, human capital models suggest that agencies should periodically assess their monetary awards systems to ensure that they help attract and retain qualified staff. Patent examiners' awards are based largely on the number of applications they process, but the assumptions underlying their application processing quotas have not been updated since 1976. USPTO management and examiners have differing opinions on whether these assumptions need to be updated. For example, according to examiners, the assumptions do not reflect the impact of the increased use of electronic tools that has reduced the time required to find relevant patent literature but at the same time has increased the amount of literature that must be reviewed. As a result, many of the examiners and supervisory patent examiners in our focus groups and respondents to previous agency surveys reported that examiners do not have enough time to conduct high-quality reviews of patent applications. According to agency surveys, these inadequate time frames create a stressful work environment and is cited in the agency's exit surveys as a primary reason examiners leave the agency.

- Finally, counter to current workforce models, USPTO does not require ongoing technical education for patent examiners, which could negatively affect the quality of its patent examination workforce. According to agency officials, examiners automatically maintain currency with their technical fields by just doing their job of examining applications, which they believe contains the most cutting-edge information. However, patent examiners and supervisory patent examiners disagreed and said that the literature they review in applications is outdated, particularly in rapidly evolving technologies. USPTO offers some voluntary in-house training, but the agency could provide no data on the extent to which examiners have taken advantage of such training. Moreover, patent examiners told us that they are reluctant to attend such training, given the time demands involved. In contrast, USPTO's policy requires examiners to attend extensive training provided by the agency on legal issues on which examiners are periodically tested.

Although USPTO has taken a number of steps to enhance its recruiting efforts and better target a qualified pool of candidates, in light of its long-standing human capital challenges, we are recommending that it develop formal strategies to improve communication and collaboration across all levels of the organization, which will also help resolve differences of opinion between management and examiners on such issues as the assumptions underlying the quota system and requirements for technical training. In its written comments on a draft of our report (reprinted in appendix II), USPTO agreed with our findings, conclusions, and recommendations. In addition, the agency provided technical comments that we have incorporated as appropriate.

Background

USPTO administers U.S. patent and trademark law to encourage innovation and advance science and technology in two ways. First, USPTO grants to inventors exclusive rights to their inventions for a limited period of time, usually 20 years. During this time, the inventor can exclude others from making, using, selling or importing the invention. Second, the agency preserves and disseminates patent information, for example on issued patents and most patent applications. Such information allows other inventors to improve upon the invention in the original application and apply for their own patent.

To obtain a patent, inventors—or more usually their attorneys or agents—submit to USPTO an application that fully discloses and clearly describes

one or more distinct innovative features of the proposed invention (called claims) and pays a filing fee to begin the examination process. USPTO evaluates the application for completeness, classifies it by the type of patent and the technology involved,[9] and assigns it for review to one of its operational units, called technology centers, that specialize in specific areas of science and engineering.[10] Supervisors in each technology center then assign the application to a patent examiner for further review. For each claim in the application, the examiner searches and analyzes relevant United States and international patents, journals, and other literature to determine whether the proposed invention merits a patent—that is, whether the invention is a new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement to one that already exists. The examiner may contact the applicant on one or more occasions to resolve questions and obtain additional information to determine the proposed invention's potential patentability. If the examiner determines that the proposed invention merits a patent, the applicant is informed, and, upon payment of a fee, USPTO issues a patent. The applicant may abandon the application at any time during the examination process. If the application is denied a patent, the applicant may appeal the decision within an established time. Each examiner typically reviews applications in the order in which they are received by USPTO.

The time from the date an application is filed until a patent is granted, denied, or the application is abandoned is called "overall pendency." Over the past decade, overall pendency has increased on average from 20 to almost 28 months. However, pendency varies by technology center, ranging from 24 months for applications in such fields as transportation, agriculture, electronic commerce, mechanical engineering, and manufacturing to 41 months for applications in the fields of computer

[9]Patents typically fall into one of three categories: (1) utility—for useful inventions, such as processes, machines, articles of manufacture, or composition of matter; (2) design—for changes in configuration, shape, or surface ornamentation that do not involve changes in function; or (3) plant—for asexually reproducible plants. A fourth category, "reissue patents," refers to patents USPTO grants as replacements for any patent that was in some way defective; these patents constituted less than one-half of 1 percent of patents issued in fiscal year 2003.

[10]USPTO's eight technology centers are: (1) Biotechnology and Organic Chemistry; (2) Chemical and Materials Engineering; (3) Computer Architecture, Software, and Information Security; (4) Communications; (5) Semiconductors, Electrical and Optical Systems and Components; (6) Transportation, Electronic Commerce, Construction, Agriculture, National Security and License and Review; (7) Mechanical Engineering, Manufacturing, and Products; and (8) Designs for Articles of Manufacture.

architecture, software and information security (see table 1). In addition to overall pendency, USPTO monitors the time from when an application is filed until the examiner makes an initial assessment of the proposed invention's patentability and informs the applicant, called first action pendency. First action pendency also has generally increased in the past decade from 8 to over 20 months. In 2004, first action pendency ranged from an average of 14 months for applications in such fields as semiconductors and optical systems to 33 months for computer architecture and software applications. Such measures of pendency help USPTO assess its effectiveness in reviewing patent applications.

Table 1: USPTO Average Patent Pendency by Technology Center, 2004

Months		
Technology center	**Overall pendency**	**First action pendency**
Biotechnology and Organic Chemistry	29.9	19.2
Chemical and Materials Engineering	27.6	17.9
Communications	40.5	31.4
Computer Architecture, Software and Information Security	41.1	33.3
Mechanical Engineering, Manufacturing, Products and Design	24.1	15.2
Semiconductor, Electrical, Optical Systems and Components	23.9	14.0
Transportation, Construction, Agriculture, and Electronic Commerce	24.1	15.6
Average	27.6	20.2

Source: USPTO.

USPTO Has Made Greater Progress on Strategic Plan Initiatives That Enhance the Agency's Capability Rather Than Productivity and Agility

USPTO has made greater progress in implementing its Strategic Plan initiatives to make the patent organization more capable than it has been in implementing its productivity and agility initiatives. Specifically, of the activities planned for completion by December 2004, the agency has fully or partially implemented all 23 of the initiatives related to its capability theme to improve the skills of employees, enhance quality assurance, and alter the patent process through legislative and rule changes. In contrast, USPTO has partially implemented only 1 of the 4 initiatives related to the productivity theme to restructure fees and expand examination options for patent applicants and has fully or partially implemented 7 of the 11 initiatives related to the agility theme to increase electronic processing of patent applications and reduce examiners' responsibilities for literature searches. In explaining why some initiatives have not been implemented, agency officials primarily cited the need for additional funding. With passage of the legislation in December 2004 to restructure and increase the fees available to USPTO, the agency is re-evaluating the feasibility of many initiatives that it had deferred or suspended. For more details on USPTO's progress in implementing the 38 initiatives in the Strategic Plan, see appendix III.

USPTO Has Made Substantial Progress on Its Capability Initiatives

To improve the quality of its reviews of patent applications through workforce and process improvements, USPTO developed 23 capability initiatives: 9 to improve the skills of its workforce, 5 to enhance its quality assurance program, and 9 to improve processes through legislative and rule changes.

Workforce Skills Improvements

As shown in table 2, USPTO has implemented 5 and partially implemented 4 of the 9 workforce skills initiatives.

Table 2: Status of Capability Initiatives to Improve Workforce Skills

Initiatives	Implemented	Partially implemented	Not implemented
Increase the pool of qualified management candidates by adding awards to total compensation	X		
Explore alternate organizational structures for the workplace	X		
Develop interim pre-employment measures to assess English language skills	X		
Recertify the skills of examiners with authority to issue patents (primary examiners) through examinations and expanded work product reviews	X		
Certify that examiners possess the requisite knowledge, skills, and abilities prior to promotion to a position with authority to negotiate on behalf of USPTO	X		
Improve the selection and training of supervisory patent examiners		X	
Use examinations and other means to ensure that new patent examiners possess the requisite skills prior to promotion		X	
Implement a pre-employment test to assess English language skills		X	
Create an Enterprise Training Division		X	

Source: GAO analysis of USPTO data.

Although the agency has not estimated how much funding would be needed to implement the final 4 initiatives, their full implementation was hindered, in part by funding constraints, agency officials said. The current status of these partially completed initiatives is as follows:

- To improve the selection and training of managers, USPTO has added proficiency in supervisory skills to the requirements for a supervisory examiner and in 2004 required applicants for such positions to pass an examination, but the agency has not fully developed the supervisory curriculum or trained supervisors.

- To help ensure that new examiners have the requisite skills prior to promotion, USPTO has identified the knowledge, skills, and abilities needed for patent examiners and established training units in work groups for new examiners, but has not developed a structured process for subsequent promotions.

- To implement a pre-employment test to assess English language communication skills of new patent examiners, USPTO has, among

other things, revised its vacancy announcements to include English language proficiency as a required skill but has not developed an automated pre-employment test of such skills.

- USPTO has developed an action plan to establish an Enterprise Training Division, which was to have been in place in 2003, to consolidate responsibility for conducting legally required and other agencywide training, developing training policy, and monitoring funds spent on training.

Quality Assurance Enhancements

As shown in table 3, USPTO has implemented 3 and partially implemented 2 of the 5 capability initiatives to enhance its quality assurance program.

Table 3: Status of Capability Initiatives to Enhance Quality Assurance

Initiatives	Implemented	Partially implemented	Not implemented
Expand current quality assurance program to include works in progress (in-process reviews)	X		
Establish "second pair of eyes" reviews in each technology center	X		
Survey customer regarding transactions with USPTO on specific applications to supplement comprehensive customer surveys	X		
Evaluate the quality of examiners' literature searches		X	
Enhance the reviewable record for each patent application with additional information from the applicant and examiner		X	

Source: GAO analysis of USPTO data.

The status of the initiatives USPTO has partially implemented is as follows:

- The agency has begun to develop a plan and criteria to review the quality of searches and anticipates incorporating such reviews in the quality assurance program during fiscal year 2006.

- To enhance the reviewable record for patent applications, USPTO has developed guidance and amended forms to allow both examiners and applicants to provide additional information on the content of interviews and reason for decisions and strongly recommends, rather than requires, applicants and examiners to do so.

Process Improvements Related to Legislative and Rule Changes

As shown in table 4, of the 9 capability initiatives to streamline patent processing through legislative and rule changes, USPTO has implemented 1 and partially implemented 8.

Table 4: Status of Capability Initiatives to Change Legislation and Rules

Initiatives	Implemented	Partially implemented	Not implemented
Delete the requirement for physical surrender of the original patent papers	X		
Certify the legal knowledge of patent attorneys and agents who wish to practice before USPTO and periodically recertify the skills of practicing attorneys and agents		X	
Evaluate whether to adopt a unity of invention standard		X	
Simplify adjustments to the patent term		X	
Permit individuals who have been assigned patent rights to sign an oath declaring that the inventor is the original and first inventor		X	
Permit individuals who have been assigned patent rights to broaden the claims in an application		X	
Correct an inconsistency regarding unintentionally delayed submission of certain claims		X	
Eliminate certain exemptions from the requirement to publish most patent applications within 18 months of when they were first filed		X	
Amend current legislation regarding certain limitations on an inventors' right to obtain a patent		X	

Source: GAO analysis of USPTO data.

Although full implementation of these initiatives is largely dependent on actions by Congress, the status of the 8 partially implemented initiatives is as follows:

- To certify the legal knowledge of newly registering and practicing patent attorneys and agents and to monitor their practice, the agency offers registration examinations electronically year-round and issued proposed rules to harmonize ethics and disciplinary actions with the requirements in place in most states, but has not yet developed a formal program of continuing legal education requirements to periodically recertify the skills of practicing attorneys and agents.

- To evaluate whether to adopt a unity standard to harmonize U.S. examination practices with international standards and allow U.S. applicants to obtain a single patent on related claims that must currently

be pursued in separate patent applications in the United States, USPTO began a study of the changes needed to adopt a unity standard and sought public comment but has not completed its analysis, reached a decision, or drafted and introduced implementing legislation.

- For the other 6 partially implemented initiatives, USPTO is drafting proposed legislation or obtaining administrative clearance to introduce it.

USPTO Has Made Less Progress Implementing Its Productivity and Agility Initiatives

As shown in table 5, USPTO has not implemented 3 of the 4 initiatives that focus on accelerating the time to process patent applications and expand public input and has partially implemented only 1 of the productivity initiatives that allow the agency to increase fees and retain the funds. Following passage of legislation in 2004, USPTO has issued rules to increase fees generally and restructure fees to include separate components for different stages of processing both domestic and international patent applications, and for filing the application, searching the literature, and examining the claims. The separate components could, under certain circumstances, be refunded to the applicant. USPTO has not issued rules governing the refund of domestic fees. The revised fees are effective for 2005 and 2006.

Table 5: Status of Productivity Initiatives

Initiatives	Implemented	Partially implemented	Not implemented
Restructure fees and provide for refunds		X	
Offer patent applicants a choice of up to five examination options, based in part on the ability to rely on searches conducted by others			X
Offer patent applicants the option of an accelerated examination			X
Revise postgrant review procedures to allow greater public input			X

Source: GAO analysis of USPTO data.

Similarly, as shown in table 6, USPTO has not implemented 4 of the 11 initiatives related to agility, has only implemented 1 and partially implemented 6. These 11 initiatives are designed to further the agency's goal to create a more flexible organization and include efforts to increase electronic processing of patent applications, reduce examiners'

responsibilities for literature searches, and participate in worldwide efforts to streamline processes and strengthen intellectual property protection.

Table 6: Status of Agility Initiatives

Initiatives	Implemented	Partially implemented	Not implemented
Establish an information security program	X		
Transition to electronic patent processing		X	
Transition to electronic processing for postgrant reviews		X	
Ensure availability of critical data in the event of a catastrophic systems failure		X	
Promote international harmonization and pursue goals to strengthen international intellectual property rights of U.S. inventors		X	
Pursue international agreements to share patent search results		X	
Accelerate Patent Cooperation Treaty reforms		X	
Rely on other sources to classify patent documents			X
Rely on other sources to support domestic and international literature searches			X
Rely on other sources to transition to a new global patent classification system			X
Develop stringent conflict of interest clauses for search firms			X

Source: GAO analysis of USPTO data.

The status of the 6 partially implemented agility initiatives to increase electronic processing and harmonize U.S. and international practices is as follows:

- Although USPTO has largely accomplished the actions related to implementing image-based electronic processing of patent applications, it has not achieved the full extent of electronic sharing of patent documents with the European Patent Office the initiative had anticipated and the two offices continue to finalize security and protocols between their servers.

- USPTO has amended rules to generally allow electronic filing of postgrant review documents and trained additional judges in streamlined procedures, but it has not defined records management schedules for electronic documents or implemented full electronic processing capabilities to support these reviews, such as text searching and the ability to receive, file, store, and view multimedia files.

- To ensure the availability of critical data in the event of a catastrophic failure, USPTO has certified and accredited its classified system and its mission-critical and business-essential systems, uses scanning tools to identify security weaknesses, and uses intrusion detection systems, but has not acquired the hardware, software, staff, and facilities for a backup data center.

- To promote harmonization of patent processing among international intellectual property offices and pursue goals to strengthen international intellectual property rights of U.S. inventors, USPTO participated in substantive patent treaty discussions that addressed such topics as the first-to-file (European) versus the first-to-invent (U.S.) standards, access to genetic resources, and definitions for such terms as prior art and novelty.

- To pursue multi- and bilateral agreements with other intellectual property offices, USPTO completed pilot programs to compare search results with the Japan and European Patent Offices and with patent offices in Australia and the United Kingdom.

- Regarding the acceleration of Patent Cooperation Treaty reforms, USPTO indicated that many significant reform procedures have been adopted in the last several years.

Although USPTO has not determined how much funding would be needed, officials said that the lack of adequate funding largely limited its ability to complete planned actions on productivity and agility initiatives that had not been fully implemented. With passage of the fee-restructuring legislation in December 2004, USPTO plans to commence work on these suspended initiatives. For example, it has assigned new teams to evaluate the feasibility of using contractors and international intellectual property offices to conduct literature searches. For greater detail on USPTO's progress in implementing the 38 initiatives in the Strategic Plan, see appendix III.

USPTO Has Taken Steps to Help Attract and Retain a Qualified Patent Examiner Workforce, but Long-Term Success Is Uncertain

Since 2000, USPTO has taken steps intended to help attract and retain a qualified patent examination workforce. The agency has enhanced its recruiting efforts and has used many human capital flexibilities to attract and retain qualified patent examiners. However, during the past 5 years, the agency's recruiting efforts and use of benefits have not been consistently sustained, and officials and examiners at all levels in the agency told us that the economy has more of an impact on USPTO's ability to attract and retain examiners than any actions taken by the agency. Consequently, how the agency's actions will affect its long-term ability to maintain a highly qualified workforce is unclear. While USPTO has been able to meet its hiring goals, attrition has recently increased.

USPTO Has Enhanced Recruiting Efforts to Attract Qualified Examiners

USPTO's recent recruiting efforts have incorporated several measures identified by GAO and others as necessary to attract a qualified workforce.[11] First, in 2003, to help select qualified applicants, USPTO identified the knowledge, skills, and abilities that examiners need to effectively fulfill their responsibilities. As part of this study, USPTO conducted focus group meetings with, and surveys of, experienced examiners to identify and validate key skills.[12] In doing so, the agency was responding to a recommendation from the Department of Commerce's OIG to better target candidates likely to stay at USPTO.[13]

Second, in 2004, the agency's permanent recruiting team, composed of senior and line managers,[14] participated in various recruiting events, including visits to the 10 schools that the agency targeted based on the diversity of their student population and the strength of their engineering

[11]See GAO, *Human Capital: A Self-Assessment Checklist for Agency Leaders*, GAO/OCG-00-14G, version 1 (Washington, D.C.: September 2000); and Office of Personnel Management, *Human Capital Assessment Accountability Framework* (Washington, D.C., Sept. 20, 2000).

[12]USPTO, KSA Work Team: Knowledge, Skills and Abilities Project (Alexandria, Va., August 2003).

[13]Department of Commerce, Office of Inspector General, *U.S. Patent and Trademark Office: Patent Examiner Hiring Process Should be Improved*, Final Inspection Report No. BTD-14432-2-0001 (Washington, D.C., March 2002).

[14]USPTO's permanent recruiting team was established in 2002. However, the agency suspended recruiting efforts in 2002 and 2003 in the face of budgetary uncertainty.

and science programs.[15] The team also visited 22 additional schools, participated in two job fairs, and attended three conferences sponsored by professional societies. To assist the recruiting team, USPTO hired a consultant to develop a new brand image for the agency, shown in figure 1 below.[16] As part of this effort, USPTO and the consultant surveyed USPTO managers and supervisors and conducted focus groups with a range of ethnically diverse audiences, from college seniors to experienced professionals, to identify the characteristics of examiners and how the target market perceives the agency, as well as to get a sense of their work habits, values, and perceptions of work at USPTO. According to USPTO, the agency's new brand focuses on the vital role intellectual property plays in the U.S. economy and the career momentum of patent examiners. Agency officials said that USPTO uses its employment brand image at every opportunity, from Internet banner ads to print advertisements. They believe that this has enhanced public awareness of the agency and has helped distinguish USPTO from other employers.

[15]The 10 target schools selected are Florida International University, North Carolina Agricultural and Technical State University, North Carolina State University, University of Florida, University of Maryland, University of Pennsylvania, University of Puerto Rico-Mayaguez, University of Virginia, University of Wisconsin-Madison, and Virginia Polytechnic and State University.

[16]TMP Worldwide Advertising and Communications, *USPTO Task 1: Research and Evaluation* (Alexandria, Va., Mar. 10, 2004).

Figure 1: USPTO's 2004 Brand Image

Source: USPTO.

Figure 2: USPTO's 2002 Brand Image

Source: USPTO.

Finally, for 2005, USPTO developed a formal recruiting plan that, among other things, identified hiring goals for each technology center and described USPTO's efforts to establish ongoing partnerships with the 10 target schools. In addition, USPTO trained its recruiters in effective interviewing techniques to help them better describe the production system and incorporated references to the production-oriented work environment in its recruitment literature. During a USPTO career fair in February 2005, we observed that potential candidates were provided with a range of information about the work environment at the agency, received handouts, and heard a formal presentation about the agency and the role and responsibilities of a patent examiner. The presentation also included overviews of the basics of intellectual property, the patent examination

process, USPTO's production model, the skill set needed for a successful patent examiner, and the benefits the agency offers.

USPTO Has Used Many Federal Human Capital Benefits to Attract and Retain Examiners

USPTO has used many of the human capital benefits available under federal personnel regulations to attract and retain qualified patent examiners. Among other benefits, USPTO has offered

- recruitment bonuses ranging from $600 to over $10,000;
- a special pay rate for patent examiners that is 10 percent above federal salaries for comparable jobs;
- noncompetitive promotion to the full performance level;
- flexible spending accounts that allow examiners to set aside funds for expenses related to health care and care for dependents;
- reimbursement for law school tuition;
- a transit subsidy program that was recognized in 2003 and 2004 as one of the best in the greater Washington, D.C., area;
- flexible working schedules, including the ability to schedule hours off during midday;
- work at home opportunities for certain supervisory and senior examiners;
- no-cost health screenings at an on-site health unit staffed with a registered nurse and part-time physician;
- casual dress policy; and
- on-site child care and fitness centers at USPTO's new facility.

According to many of the supervisors and examiners in our focus groups, these benefits were a key reason they were attracted to USPTO and are a reason they continue to stay. The benefits most frequently cited as important by examiners were the flexible working schedules and competitive salaries. Many supervisors and examiners said that the ability to set their own hours allowed them to better coordinate their work

schedules with their personal commitments, such as a child's school or day care schedule. Concerning salaries, examiners also cited the special pay rate offered by USPTO as increasing the agency's competitiveness with the private sector. Although entry-level pay for examiners may not be as high as in the private sector, examiners who have been with the agency for about 5 to 7 years can earn up to $100,000 annually,[17] and new examiners can increase their pay relatively rapidly, in part because of the noncompetitive promotion potential available at the agency. However, some examiners commented that the benefit of the special pay rate is eroding over time because examiners do not receive annual locality pay adjustments to compensate for the high cost of living in the Washington, D.C., area. According to USPTO management, in 2002 the agency sought such an adjustment, but OPM denied the request because of a lack of justification. In addition to basic salary, examiners may also earn various cash awards based on production or other types of meritorious performance.

Lack of Consistent Recruiting Efforts and Benefits, along with Changes in the Economy, Could Affect USPTO's Efforts

The long-term effect of USPTO's recruiting efforts and use of benefits is difficult to predict for a variety of reasons. First, many of USPTO's efforts have been in place for a relatively short duration and have not been consistently maintained. For example, as shown in table 7, USPTO suspended recruitment and hiring in fiscal year 2000, which agency officials said resulted in its inability to meet its hiring goals for the year. Except for 2002, in those years where USPTO used its recruiting strategy consistently, such as 2001, 2003, and 2004, it not only met its hiring goals, but exceeded them.

[17]Career opportunities for patent examiners continue through the senior executive level. Historically, senior executives at USPTO have come from the ranks of examiners.

Table 7: USPTO Patent Examiner Hiring Data, Fiscal Years 2000–2004

Fiscal year	Examiner hiring goal	Examiner hires
2000	475	375
2001	360	414
2002	788	769
2003	300	308
2004	250	443

Source: USPTO.

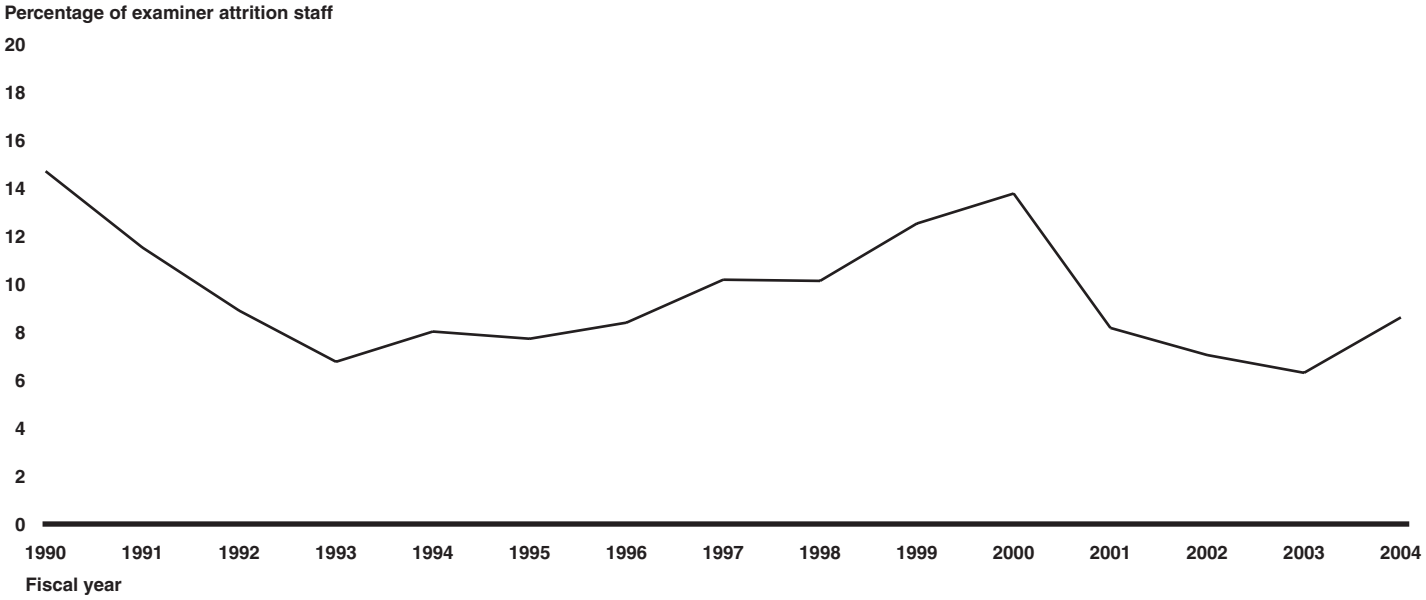
The second reason that creates uncertainty about USPTO's success in retaining examiners is that USPTO has occasionally suspended some important employee benefits. For example, funding constraints led USPTO to discontinue reimbursing examiners for their law school tuition in 2002 and 2003, although the agency resumed reimbursement in 2004, when funding became available. Examiners who participated in our focus groups expressed dissatisfaction with the inconsistent availability of the benefits. Regarding law school tuition reimbursement, one examiner said, "I started when they started the [law school program] and then they cut it off and I had to pay [tuition] myself, which creates a large incentive to leave the office now that I have . . . student loans to pay off." Other examiners expressed similar views. More recently in March 2005, USPTO proposed to eliminate or modify other benefits such as examiners' ability to earn credit hours and alter examiners' ability to set their own work schedules. For example, unlike current practice, examiners would no longer be able to schedule hours off during midday without a written request approved in advance. These benefits were cited by examiners in our focus groups as key reasons for working at USPTO, and eliminating such benefits may impact future retention.

The third and possibly the most important factor that adds to the uncertainty surrounding the success of USPTO's recruitment efforts is the unknown potential impact of the economy. According to USPTO officials and examiners, because USPTO competes directly with the private sector for qualified individuals, changes in the economy have a greater impact on USPTO's ability to attract and retain examiners than any actions taken by the agency. They told us that when the economy picks up, more examiners tend to leave USPTO and fewer qualified candidates accept employment offers. Conversely, they said that when there is a downturn in the economy, employment opportunities at USPTO become more attractive. When discussing reasons for joining USPTO, many examiners in our focus groups

cited job security and lack of other employment opportunities, making comments such as "I had been laid off from my prior job, and this was the only job offer I got at the time"; "I looked towards the government because I wanted job security"; and ". . . part of the reason I came to the office is that when I first came out of college, the job market was not great."

The relationship between the economy and USPTO's ability to attract and retain examiners is reflected in its attrition rates over time. As shown in figure 3, attrition among patent examiners declined from a high of almost 14 percent in 2000 to just over 6 percent in 2003. This decline coincided with a recession in 2001, a general slowdown of the economy, and subsequent collapse of the "high tech bubble"—which caused many Internet-based businesses to close, leaving computer scientists and engineers out of work. The decline in attrition was preceded by a more robust economy during a time when the high-tech industry was building up. At that time, attrition at USPTO was steadily rising.

Figure 3: Examiner Attrition as Percentage of Staff



Source: GAO.

Since 2004, attrition has risen again to almost 9 percent, fueled in part by an increase in the number of examiners who retired. By the end of fiscal year 2010, about 12 percent of examiners will be eligible to retire.[18] Another trend that could affect USPTO's efforts to maintain a highly qualified patent examination workforce is the high level of attrition among younger, less experienced examiners. While attrition among examiners who have been at USPTO for 3 or fewer years has declined each year since 2000, attrition among these examiners continues to account for over half of all examiners who leave the agency. Attrition of examiners with 3 or fewer years of experience is a particularly significant loss for USPTO because the agency invests considerable time and money helping new examiners become proficient during the first few years. Managers and examiners told us that examiners usually become fully proficient in conducting patent application reviews in about 4 to 6 years. Managers we spoke with said the agency needs continuous recruiting efforts to offset these trends and continue to attract the best candidates. They said they hope to have constant recruitment efforts and year-round hiring in the upcoming years.

USPTO Faces Long-standing Human Capital Challenges That Could Undermine Its Recruiting and Retention Efforts

Although USPTO has taken a number of steps to attract and retain a qualified patent examiner workforce, the agency continues to face three human capital challenges of a long-standing nature that could also undermine its efforts in the future if not addressed. Current workforce models developed by GAO and others to help federal agencies attract and retain a qualified workforce suggest, among other things, that agencies establish an agencywide communication strategy, including opportunities for feedback from employees; involving management, employees, and other stakeholders in making key decisions; have appropriately designed compensation and awards systems; and develop strategies to address current and future competencies and skills needed by staff. However, USPTO lacks a collaborative culture, has an awards system that is based on outdated information, and requires little ongoing technical training for patent examiners. USPTO management and examiners do not agree on the need to address these issues.

[18]Governmentwide, about 40 percent of employees will be eligible to retire by that time.

USPTO Has Not Established Effective Mechanisms for Managers to Communicate and Collaborate with Examiners

Organizations with effective human capital models have strategies to communicate with employees at all levels of the organization, as well as involve them in key decision-making processes. However, lack of good communication and collaboration has been a long-standing problem at USPTO. For example, focus groups with examiners conducted by USPTO in 2000 identified a need for improved communication across all levels of the agency to assist in its efforts to retain examiners.[19] Accordingly, one of the goals listed in the Commissioner of Patent's 2003 performance appraisal plan was to establish an effective communication strategy. However, when we asked for the agency's communication strategy, USPTO management officials acknowledged the agency does not have a formal strategy. Instead, USPTO officials provided us with a list of activities undertaken by the agency to improve communication. However, most of these activities focused on improving communication among managers but not between managers and other levels of the organization, such as between managers and patent examiners. The efforts to communicate with examiners were largely confined to presenting information to examiners and generally were not interactive, according to examiners.

Patent examiners and supervisory patent examiners that participated in our focus groups frequently said that communication with USPTO management was poor and that managers provided them with inadequate or no information. They also said management is out of touch with examiners and their concerns and that communication with managers tends to be one way and hierarchical, with little opportunity for feedback. Management officials told us that informal feedback can always be provided by anyone in the organization—for example, through an e-mail to anyone in management. However, some patent examiners believe they will be penalized for offering any type of criticism of management actions or decisions and therefore do not provide this kind of feedback.

The lack of communication between management and examiners is exacerbated by the contentious working relationship between USPTO management and union officials and the complexity of the rules about what level of communication can occur between managers and examiners without involving the union. Union officials stated that a more collaborative spirit existed between USPTO and the examiners' union from

[19]U.S. Patent and Trademark Office, *Retention Focus Sessions with Examiners and Primary Examiners, Center for Quality Service* (Alexandria, Va., February 2000).

the late 1990s to about 2001. During this period, both parties actively worked to improve their relationship. For example, in 2001, USPTO management and the union quickly reached an agreement that led to increased pay for examiners and paved the way for electronic processing of patent applications by having examiners rely more heavily on electronic searches of relevant patent literature. According to union officials, this agreement was negotiated in about 1-1/2 weeks, improved the morale of patent examiners, and made them feel valued and appreciated. Since that time however, both USPTO management and union officials agree that their working relationship has not been as productive. Both say that despite several attempts, neither USPTO managers nor union officials have improved this relationship and that issues raised by either side are routinely presented for arbitration before the Federal Labor Relations Authority[20] because the two sides cannot agree. USPTO and union officials are currently disputing the validity of their 1986 collective bargaining agreement, which USPTO deems defunct. [21] In February 2004, this issue was presented for arbitration to determine the validity of the agreement. According to union officials, the arbitrator agreed with their position that the agreement was still valid and ordered a 1-year hiatus on negotiations on a new agreement. USPTO contends that the arbitrator said the two had "tacit agreements" but did not define the term. In March 2005, without continuing any debate regarding the validity of the 1986 agreement, USPTO issued a proposed new collective bargaining agreement with the union. The union denounced this proposal, reporting in its newsletter to examiners that "USPTO declares war on employee professionalism and patent system integrity."

Some USPTO managers alluded to this contentious relationship as one of the reasons why they have limited communication with patent examiners, who are represented by the union even if they decide not to join. Specifically, they believe they cannot solicit the input of employees directly without engaging the union. Another official, however, told us that nothing prevents the agency from having "town hall" type meetings to discuss

[20]The Federal Labor Relations Authority was established by the Civil Service Reform Act of 1978. It is charged with providing leadership in establishing policies and guidance relating to federal sector labor-management relations and with administering and resolving disputes under Title VII of the Civil Service Reform Act of 1978.

[21]A collective bargaining agreement is an official contract between USPTO and the union that sets forth the mutual understanding between the agency and union officials relative to personnel policies and practices and matters affecting the working conditions of patent examiners.

potential changes, as long as the agency does not promise examiners a benefit that impacts their working conditions. Union officials agreed that USPTO can invite comments from examiners on a plan or proposal; however, if the proposal concerns a negotiating issue, the agency must consult the examiners' union, which is their exclusive representative with regard to working conditions. For example, union officials said that agency management can involve examiners on discussions of substantive issues related to patent law and practice, such as how to implement electronic filing, but must consult the union to obtain examiners' views on issues such as the development of the Strategic Plan which contains initiatives that would entail, for example, additional reviews of examiners work and other changes to working conditions.

Given the lack of effective communication mechanisms between management and patent examiners and the poor relationship between management and the union, patent examiners report little involvement in providing input to key decision-making processes. For example, some of the examiners in our focus groups stated that although they had heard of the agency's Strategic Plan, they were not involved in developing it and had no idea what it entailed or how it was to be implemented. USPTO management officials we spoke to acknowledged that employees had no role in developing the Strategic Plan even though USPTO identifies its employees as a key stakeholder in the plan. This lack of employee involvement is not a new problem for the agency. For example, a study about the agency's performance measurement and rewards system conducted in 1995 by a private consultant stated that the agency must strive to include employees at all levels of the organization in the decision-making process to both introduce a variety of perspectives and experiences and to generate the critical support of employees to any new system developed.[22] Additionally, responses to employee surveys conducted in 1998 and 2001 by USPTO and others indicate that employees believed that they did not play a meaningful role in decision making.[23] Specifically, a quarter of the examiners surveyed in 1998 expressed satisfaction with their

[22]Booz-Allen & Hamilton Inc., *PTO Goal Study—Task One: An Assessment of the Current Performance Measurements and Rewards System* (May 1995).

[23]Sirota Consulting, *Patents: USPTO Survey Results* (Alexandria, Va., November 2000); USPTO, Office of Quality Management and Training, Center for Quality Services, *Patents: 2001 Employee Survey, Summary of Findings* (Alexandria, Va., September 2001); and Center for Quality Services, *2002 Federal Human Capital Survey, Overview of USPTO Results* (Washington, D.C., April 2003).

level of involvement in decisions that affect their work. In 2001, less than half of examiners who responded to the survey said they believe USPTO management trusts and respects them or values their opinions. Agency-specific data from the 2004 federal human capital survey conducted by the Office of Personnel Management have not been released.

Managers told us that examiners do not need to be involved in decision making because all of the agency's senior managers—from the Commissioner down—"came up through the ranks." Moreover, they said the basic role of the agency has not changed in 200 years. As a result, senior managers believe they bring the staff perspective to all planning and decision-making activities. However, examiners in our focus groups believe that senior managers are out of touch with the role of examiners, making comments such as "I think it would help if upper management who haven't examined in decades could try to do some of it now—it's so drastically different than when they were doing it—and realize how difficult it is, and then maybe they might get a clue. I really don't think that they realize how much work it takes to examine an application. It is so different than when they were examining." Examiners in our focus groups said that the lack of communication and involvement has created an atmosphere of distrust in management officials by examiners and has lowered examiners' morale.

Examiners' Monetary Awards Are Based on Outdated Assumptions about the Time It Takes to Process a Patent Application

According to human capital models, an agency's compensation and rewards system should help it attract, motivate, retain, and reward the people it needs to achieve its goals. To ensure that their systems meet these criteria, agencies should periodically assess how they compensate staff and consider changes, as appropriate. Patent examiners' monetary awards are based largely on the number of patent applications they process, but the assumptions underlying their annual application-processing quotas (called production quotas) have not been updated since 1976. Depending on the type of patent and the skill level of the examiner, each examiner is expected to process an average of 87 applications per year at a rate of 19 hours per application. Examiners who consistently do not meet their quotas may be dismissed. Patent examiners may earn cash awards based

on the extent to which they exceed their production quotas.[24] Although examiners in our focus groups generally support production quotas as a way to guide their work and provide an objective basis for cash awards, they said that the time estimates involved are no longer accurate.

Examiners in our focus groups told us that, in the last several decades, the tasks for processing applications have greatly increased while the time allowed has not. For example, examiners said the number of claims per application have increased, which in turn increases the amount of relevant literature they must review and analyze for each application. Also, while the greater use of electronic search tools has improved their access to relevant patent literature, the use of such tools has also increased the amount of literature they must review. In addition, the complexity of applications in some fields has increased significantly, requiring more time for a quality review. Neither USPTO nor the examiners union has collected information on the effects that such changes as improvements in electronic search capabilities have had on the time required to review patent applications.

Moreover, many examiners in our focus groups said that the time limitations of the current production quotas are inconsistent with producing high-quality work and do not adequately reflect the actual tasks and time required to examine applications. For example, examiners have responsibilities included in their job expectations, such as responding to calls from applicants and the public and providing more documentation for their decisions, which are not accounted for in the production model. Examiners expressed concern that although the agency's emphasis on quality has increased under the Strategic Plan, examiners have not been allowed more time to fulfill these increased responsibilities for quality, and there are no negative consequences for examiners who produce low-quality work. Examiners told us that voluntarily working overtime to meet quotas is common at USPTO, and they find it demoralizing not to have enough time to do a good quality job. In commenting on a draft of this report, USPTO stated that quality is a critical element of an examiner's performance standards and if an examiner does not maintain quality, their

[24]Individual goals are adjusted based on the technology in the application and the skill level of the examiner. For example, a junior patent examiner has more time to process an application than a senior examiner. Similarly, examiners who process applications for biotechnology inventions have more time than examiners who process applications for some manufactured items.

rating would reflect this deficiency. Consequences would depend on the level of deficiency.

Employee surveys conducted since 1998 suggest that these concerns are not new to the agency. Specifically, a quarter of the examiners who responded to the agency's employee surveys during the period 1998 to 2001 said that the amount of time available for their work was sufficient to produce high-quality products and services. The 1995 study conducted by a private consultant also noted that USPTO is production driven and that the agency's emphasis on production placed considerable stress on examiners. Although less than 25 percent of patent examiners who left USPTO in 2002 and 2004 actually completed an exit survey, about half who did cited dissatisfaction with the nature of the job, the production system, and the workload as factors that had the most impact on their decision to leave the agency.

In contrast, USPTO managers had a different perspective on the production model and its impact on examiners. They stated that the time estimates used in establishing production quotas do not need to be adjusted because the efficiencies gained through actions such as the greater use of technology have offset the demands resulting from changes such as greater complexity of the applications and increases in the number of claims. Moreover, they said that for an individual examiner, reviews of applications that take more time than the estimated average are generally offset by other reviews that take less time.

USPTO Does Not Require Ongoing Technical Education for Patent Examiners

Current workforce models suggest that professional organizations such as USPTO make appropriate investments in education, training, and other developmental opportunities to help build the competencies of its employees. Reviewing patent applications involves knowledge and understanding of highly technical subjects, but USPTO does not require ongoing training on these subjects. Instead, USPTO only requires newly hired examiners to take extensive training on how to be a patent examiner during the first year, and all other required training is focused on legal training. For example, newly hired examiners are required, within their first 10 months at the agency, to take about 200 hours of training on such topics as procedures for examining patent applications, electronic tools used in the examination process, and patent law and evidence. In addition, almost all patent examiners are required to take a range of ongoing training on legal matters, including patent law. As a result of the implementation of some Strategic Plan initiatives, additional mandatory training to help

examiners prepare for tests to certify their legal competency and ensure their eligibility for promotion from a GS-12 level to a GS-13 is also required. In addition, patent examiners who have the authority to issue patents (generally GS-14s or above) must pass tests on the content of legal training every 3 years. In contrast, patent examiners are not required to undertake any ongoing training to maintain expertise in their area of technology, even though the agency acknowledges that such training is important, especially for electrical and electronic engineers. Specifically, in its 2001 justification for examiners' special pay rates, the agency stated, "Engineers who fail to keep up with the rapid changes in technology, regardless of degree, risk technological obsolescence."

USPTO does offer some voluntary in-house training, such as technology fairs and industry days at which scientists and others are invited to lecture to help keep patent examiners current on the technical aspects of their work. Because this training is not required by USPTO, patent examiners told us they are reluctant to attend such training given the time demands involved. USPTO also offers a voluntary external training program for examiners to update their technical skills. Under this program, examiners may take technical courses related to their area of expertise at an accredited college or university. USPTO will pay up to $5,000 per fiscal year for each participant and up to $150 per course for required materials, such as books and lab fees. In addition, agency managers told us the agency will pay registration fees for a small number of examiners to attend conferences, although sometimes it will not pay travel expenses. While USPTO officials told us they knew of examiners who had taken advantage of these opportunities, the agency could provide no data on the extent to which examiners had taken advantage of these voluntary training opportunities. Some examiners in our focus groups said that they did participate in these training opportunities, but others said they did not because of the monetary costs or personal time involved.

USPTO believes that a requirement for ongoing technical training is not necessary for patent examiners because the nature of the job keeps them up-to-date with the latest technology. According to agency officials, the primary method for examiners to keep current in their technical fields is by processing patent applications. However, patent examiners and supervisors in our focus groups said that often the literature cited in the application they review for patents, particularly in rapidly developing technologies, is outdated, can be too narrowly focused, and does not provide them the big picture of the field. For example, in certain fields, such as computer software and biotechnology, some examiners told us that

the information cited in the application may be several years old even though it may have been current at the time the application was submitted.

Conclusions

To improve its ability to attract and retain the highly educated and qualified patent examiners it needs, USPTO has taken a number of steps recognized by experts as characteristic of highly effective organizations. However, the lack of an effective communication strategy and a collaborative environment that is inclusive of all layers within the organization could undermine some of USPTO's efforts. Specifically, the lack of communication and collaborative culture has resulted in a general distrust of management by examiners and has caused a significant divide between management and examiners on important issues such as the appropriateness of the current production model and the need for technical training. We believe that unless USPTO begins the process of developing an open, transparent, and collaborative work environment, its efforts to hire and retain examiners may be negatively impacted in the long run.

Recommendations for Executive Action

We recommend that the Secretary of Commerce direct the Under Secretary of Commerce for Intellectual Property and Director of the U.S. Patent and Trademark Office to take the following two actions: develop formal strategies to (1) improve communication between management and patent examiners and between management and union officials, and (2) foster greater collaboration among all levels of the organization to resolve key issues discussed in this report, such as the assumptions underlying the quota system and the need for required technical training.

Agency Comments and Our Evaluation

In written comments on a draft of our report, the Under Secretary of Commerce for Intellectual Property and Director of USPTO agreed with our findings, conclusions, and recommendations. The agency's comments suggest that USPTO will develop a communication plan and labor management strategy and educate and inform employees about progress on initiatives, successes, and lessons learned. In addition, USPTO indicated that it would develop a more formalized technical program for patent examiners to ensure that their skills are fresh and ready to address state-of-the-art technology. USPTO also provided technical comments that we have incorporated, as appropriate. USPTO's comments are included in appendix II.

We are sending copies of this report to interested congressional committees; the Secretary of Commerce; the Under Secretary for Intellectual Property and Commissioner of the U.S. Patent and Trademark Office; and other interested parties. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or mittala@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made contributions to this report are listed in appendix IV.

Anu K. Mittal
Director, Natural Resources
and Environment

Scope and Methodology

We were asked to report on various efforts being undertaken by the U.S. Patent and Trademark Office (USPTO) about its (1) overall progress in implementing the initiatives in the 21st Century Strategic Plan related to the patent organization; (2) efforts to attract and retain a qualified patent workforce; and (3) remaining challenges, if any, in attracting and retaining a qualified patent workforce.

To determine USPTO's progress toward implementing the Strategic Plan initiatives for the patent organization, we reviewed the initiatives contained in the plan, as well as agency documents regarding USPTO's progress in implementing each initiative. We also interviewed key USPTO officials and union officials about the plan's implementation.

To determine what actions USPTO has taken to attract and retain a qualified patent workforce and what challenges, if any, the agency faces in this area, we reviewed USPTO's Workforce Plan and other policies and practices related to human capital. We interviewed USPTO management, union officials, and relevant interest groups, as well as officials from the Department of Commerce, its Office of Inspector General (OIG), and the Office of Personnel Management (OPM) about human capital initiatives undertaken by USPTO. We reviewed evaluations of USPTO human capital management efforts by OIG and by a private consultant. We reviewed USPTO employee surveys, USPTO documents on hiring and retention, and OPM reports on USPTO. We also reviewed results from USPTO and OPM employee surveys and compared human capital policies and practices with best practices recommended by GAO and OPM. In addition, we attended a USPTO career fair for patent examiners.

To obtain the perspective of patent examiners and supervisory patent examiners on issues related to USPTO's ability to attract and retain a qualified patent examination workforce, we conducted 11 focus groups. Participants were randomly selected from all patent examiners and supervisory patent examiners who had been at USPTO at least 9 months. A total of 91 examiners and supervisory examiners attended the focus groups. The number of participants in the groups ranged from 6 to 11; participants in 8 of the groups were patent examiners while the other 3 groups encompassed supervisory patent examiners. Participants were selected from both USPTO locations (Alexandria and Crystal City, Virginia). We developed questions for the focus groups based on literature reviews and by speaking with USPTO management, union officials, and interest groups. In addition, we developed a short questionnaire that asked for individual views of issues similar to those being discussed in the

groups. Following each discussion question, participants filled out the corresponding questions in their questionnaires. Trained facilitators conducted the focus groups and transcripts were professionally prepared. Prior to using the transcripts, we checked each for accuracy and found that they were sufficiently accurate for the purposes of this study.

We conducted a content analysis in order to produce a summary of the respondents' comments made during the focus groups. The classification plan was developed by two GAO analysts who independently reviewed the transcripts and proposed classification categories for each question. The classification categories were finalized through discussion with a third analyst. One analyst then coded all comments made during each discussion question into the categories. The accuracy of the coding was checked by another analyst, who independently coded a random sample of transcript pages for each question. The accuracy of the content coding was sufficiently high for the purposes of this report. Finally, the number of comments in each category and subcategory was tallied, and the resulting summary of the comments was verified by a second analyst. A quantitative analysis was conducted on the data from the questionnaires.

Our review focused exclusively on the activities of the patent organization and not those of the trademark organization. We conducted our review from June 2004 through May 2005 in accordance with generally accepted government auditing standards.

Comments from the U.S. Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

JUN - 7 2005

Ms. Anu K. Mittal
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Ms. Mittal:

Thank you for the opportunity to comment on the Government Accountability Office (GAO) draft report GAO-05-720 entitled, *Intellectual Property: USPTO Has Made Progress in Hiring Examiners but Challenges to Retention Remain.*

We very much appreciate the effort your team made in reviewing: (1) overall progress in implementing the initiatives in the *21st Century Strategic Plan* related to the Patent organization; (2) efforts to attract and retain a qualified patent workforce; and (3) remaining challenges, if any, in attracting and retaining a qualified patent workforce.

USPTO's first priority, as stated in the *21st Century Strategic Plan,* is improving the quality of the patents that we issue and trademarks that we register. This priority rests on the premise that American innovators deserve our absolute best efforts to ensure enforceable intellectual property rights here and abroad. To implement this priority, we have focused on both workforce and process improvements.

We appreciate the report's acknowledgment that the USPTO has fully or partially implemented all 23 initiatives focused on improving the skills of employees, enhancing quality assurance, and improving the patent system through changes in existing laws or regulations. We are proud that all of the capability initiatives have been partially or fully implemented in such a short amount of time.

By way of update, after GAO concluded its review, the USPTO issued three Requests for Proposals for the three outsourcing initiatives aimed at reducing pendency, including Pre-Grant Publication Classification, Reclassification, and Patent Cooperation Treaty Search.

As GAO states in its draft report, the USPTO has taken significant steps to attract and train a qualified patent examination workforce. Specifically, we have enhanced our recruiting efforts,

P.O. Box 1450, Alexandria, Virginia 22313–1450 - WWW.USPTO.GOV

using many of the human capital benefits available under Federal personnel regulations. Some aspects of the USPTO's recruitment practices are well established. For example, our hiring and recruitment efforts have always targeted schools with strong engineering and science programs. USPTO recruiters have historically visited such schools, and have also reached out to qualified candidates by hosting job fairs and attending conferences sponsored by professional societies.

The USPTO makes every effort to maintain its highly attractive benefits program, consistent with responsible fiscal management. While lack of funding led the USPTO to suspend its popular law school program in fiscal years 2002 and 2003, the program was reinstated in 2004 as soon as funding was available. We are pleased that, with the full support of the Administration and Congress, USPTO now has the funds available to hire patent examiners at levels sufficient to keep pace with increased patent application filings. While our inability to hire has resulted in a record backlog of patent applications awaiting action, we hope to secure a long-term fee structure that will permit necessary patent examiner and support hiring, as well as the capacity to provide valuable benefits to our workforce.

There is no USPTO without our employees. We must be able to recruit and retain the best employees, and a strong human capital management program is a prerequisite for success. Prior to this year, our Office of the Chief Administrative Officer (CAO) had been combined with our Office of the Chief Financial Officer. One SES manager had oversight and responsibility for both budget and fiscal corporate planning activities, as well as all human capital management functions. Clearly, no one person could meaningfully cover so much territory. Recognizing the practical limits of placing so much management responsibility with one person, and acknowledging the importance of the CAO function to USPTO's success, in March 2005, I directed the realignment of the functions, programs and activities under the former Chief Financial Officer and Chief Administrative Officer into two distinct organizational units: (1) the Chief Financial Officer, and (2) the Chief Administrative Officer (CAO). This realignment created two distinct organizations reporting to the Under Secretary and Director: one for planning, financial management and outsourcing activities; and, a second, for administrative and human capital management activities. Separating these functions is designed to strengthen the Office's ability to effectively direct management focus to critical human capital efforts, including training, labor-management relations, and performance issues.

Consistent with this realignment, in May 2005 the USPTO hired a new CAO. Under the new CAO's leadership, the USPTO will establish a Human Capital Council composed of senior-level representatives from all USPTO business units, and will develop a Comprehensive Human Capital Improvement Plan.

We agree with GAO's finding that key improvements still need to be made, such as:
(1) improving communication between management and patent examiners and between management and union officials; and (2) fostering greater collaboration among all levels of the organization.

The following are our comments on the specific recommendations contained in the Draft Report:

Recommendation 1 – "improve communication between management and patent examiners and between management and union officials"

The USPTO acknowledges that a formal method of obtaining input from employees should be established. For that reason, management has extended a standing offer to the examiners' union to meet regularly to discuss any issues of concern.

The USPTO participated in the Office of Personnel Management's (OPM) 2004 Federal Human Capital Survey. We are working with OPM to further analyze employees' response data. This effort will provide insights into the areas to which we should initially direct our focus. We also hope to use this data to develop a communication plan and labor-management strategy directed at increasing awareness and understanding of USPTO goals, objectives and programs; educating employees on how they can contribute to these efforts and their impacts on the USPTO; and continually informing our employees about progress on initiatives, successes, and lessons learned.

Recommendation 2 – "foster greater collaboration among all levels of the organization to resolve key issues discussed in this report such as the assumptions underlying the quota system and the need for required technical training"

A recent report from the Office of the Inspector General (OIG) of the Department of Commerce found that a reduction in examiner's goals would be justified based on efficiencies that have been gained through various automated systems that have been deployed by USPTO. We assume that GAO's findings are not meant to suggest that more time may be needed for examination. In this regard, it is important to note that a new award package has been developed which is closely tied to the USPTO's goals and is presently the subject of proposed negotiation with the examiners' union.

The USPTO has an active program of technology-specific training for all examiners. Examiners are encouraged to maintain current technical knowledge in their fields through the offering of tuition reimbursement for any job-related technical training, and through the use of on-site technology fairs and technology-centered training seminars. To further support examiners in their efforts to keep current with technological trends, managers help plan and host technology specific events designed for enhanced examiner learning. Examiners are encouraged to attend such training, and are given non-production time to participate in these activities. Most sessions are filled to capacity. Additionally, examiners are granted non-production time for technical training events, including Technology Forums in areas of emerging technologies, regularly scheduled technical lectures series by outside scientists, and off-site visits to meet with scientists from academia, government and private industry.

In addition to these ongoing efforts, we will develop a more formalized technical training program for patent examiners, to ensure that their skills are fresh and ready to address state-of-the-art technology in patent applications.

We have also provided an enclosure with a list of specific comments that clarify and/or correct certain points covered in your report.

GAO employees worked long hours to prepare the draft report. I would like to thank you and the GAO team, and specifically mention Ms. Cheryl Williams, Ms. Vondalee Hunt, Ms. Ilga Semeiks, and Mr. Don Pless. I understand that Ms. Williams, Ms. Hunt, and Ms. Semeiks spent many hours talking to USPTO employees, conducting interviews and focus sessions, and of course, reviewing documents and writing the draft report itself. We thank you for your dedication to the highest standards of professionalism in preparing the draft report.

Again, we appreciate this opportunity to comment on the draft report.

Sincerely,

JON W. DUDAS
Under Secretary and Director

Enclosure

Progress on Strategic Plan Initiatives

USPTO issued its 21st Century Strategic Plan in June 2002, then updated and rereleased it in February 2003. The Strategic Plan responds to the Government Performance and Results Act and direction from Congress. The plan is centered on three themes—capability, productivity, and agility.

Strategic Theme: Capability

To become a more capable organization that enhances quality through workforce and process improvements, USPTO developed initiatives to improve the skills of its workforce (transformation), enhance its quality assurance program (quality), and improve processes through rule changes or proposed legislative changes (legislative/rules changes).

Table 8: USPTO Capability Initiatives

Capability initiatives	Status of actions planned through December 2004	Implementation details
Transformation		
Increase the pool of competent, qualified candidates for management positions, and reward current managers by offering awards of up to 10 percent of base salary as part of the compensation package.	Implemented	Actions implemented: USPTO developed award criteria and sought input from the supervisory examiners' professional association and USPTO senior managers. The program was approved in 2003, and performance appraisal plans for supervisory examiners were revised for 2004. As of November 2004, awards had been paid to all qualifying managers.
Transform the workplace by exploring alternative organizational concepts and structures.	Implemented	Actions implemented: Conducted preliminary consultations and research with the National Academy of Public Administration in 2002.
Develop interim pre-employment measures to assess English language oral and written communication skills for new patent examiners.	Implemented	Actions implemented: Developed procedures for supervisory patent examiners and hiring officials to use in assessing communication skills, and trained individuals in their use.

(Continued From Previous Page)

Capability initiatives	Status of actions planned through December 2004	Implementation details
Recertify the skills of examiners with the authority to issue patents (primary examiners) through examinations and expanded reviews of work products.	Implemented	Actions implemented: Developed an examination to recertify primary examiners every 3 years. As of December 2004, approximately one-third of primary examiners had successfully completed the examination. An additional one-third will be tested in 2005 and 2006. Thereafter, primary examiners will be retested once every 3 years. Increase the number of primary examiners' work products that are reviewed in annual quality reviews to more than four. Require primary examiners to pass examinations on the content of periodic training on changes in patent law, practice, or procedures.
Certify the knowledge, skills, and abilities of examiners before they are promoted to a position with the authority to negotiate with applicants (partial signatory authority or GS-13 level).	Implemented	Actions implemented: In 2003, USPTO developed a legal competency examination to certify the skills of patent examiners prior to promotion to GS-13. From March through December 2004, 152 examiners had successfully completed the examination and been promoted. Another 85 had taken the examination to help them prepare for future promotion. The requirement to pass the examination became effective March 1, 2004.
Use examinations and other means to ensure that new patent examiners possess the requisite knowledge, skills, and abilities prior to initial promotion decisions.	Partial	Actions implemented: In 2003, USPTO identified the knowledge, skills, and abilities needed for patent examiners, established training units in work groups for new examiners (Training Art Units), and developed recruitment materials to better educate candidates on the nature of the work. Actions not implemented: USPTO has not sought OPM approval to extend the probationary period for patent examiners to two years, developed a structured process for promotions after the first 6 or 12 months, or developed a pre-employment test to identify candidates with characteristics of successful examiners.
Implement a pre-employment test to assess English language oral and written communication skills for new patent examiners.	Partial	Actions implemented: Vacancy announcements include English language proficiency as a requirement; the automated application system was modified to include a writing sample, and in-person interviews are used to assess oral communication skills. To the extent possible, check references regarding communication skills. USPTO assessed the communication skills of all patent examiners hired from 2002 to 2004. Actions not implemented: The design and implementation of an automated pre-employment test was deferred due to a lack of funding, according to USPTO officials.

(Continued From Previous Page)

Capability initiatives	Status of actions planned through December 2004	Implementation details
Improve the selection and training of supervisory patent examiners.	Partial	Actions implemented: In November 2003, USPTO added proficiency in supervisory skills to the requirements for selection as a supervisory patent examiner. In 2004, applicants for supervisory positions were required to pass a certification examination. Some training modules, such as coaching and feedback, have been developed and offered. Actions not implemented: Although a full complement of training was to be in place by September 2004, some courses are being considered or under development, including various management development courses.
Create an Enterprise Training Division in the Office of Human Resources to centralize responsibility for legally required hard and soft skills, leadership, and other agencywide training as well as coordinating agencywide training policy and tracking funds spent on training.	Partial	Actions implemented: USPTO developed a draft action plan to create an Enterprise Training Division in November 2004 and began work to select a USPTO-wide learning management system, implement an e-learning pilot, and establish a development center. Actions not implemented: This initiative was to have been completed in 2003 but has not been implemented.
Quality		
Expand the current internal quality review program to include works in progress.	Implemented	Actions implemented: By October 2004 the Office of Patent Quality Assurance (OPQA) had expanded its quality reviews to include reviews of works in process. The results of these reviews will be reported in the agency's fiscal year 2005 accountability report.
Establish in each technology center some level of "second pair of eyes" reviews of work products.	Implemented	Actions implemented: By October 2004, managers for each technology center have designed and implemented quality assurance reviews that include some level of second pair of eyes review. In addition, results from OPQA reviews identify work units with high error rates for more intensive second pair of eyes reviews. Quality reviewers in each technology center also annually review work products for examiners as part of performance appraisals.
Augment periodic comprehensive customer surveys with surveys on specific applications (transactional surveys).	Implemented	Actions implemented: Adjust the timing of comprehensive surveys to every other year and conduct transactional surveys in the off years. The first transactional survey was conducted in 2003. Although USPTO has conducted surveys under generic approval from the Office of Management and Budget (OMB) since 1995, beginning in 2004, each survey must be reviewed and approved separately by OMB, a process that can take about 6 months. As a result, USPTO did not conduct a comprehensive survey in 2004.

(Continued From Previous Page)

Capability initiatives	Status of actions planned through December 2004	Implementation details
Evaluate the quality of searches conducted by patent examiners.	Partial	Actions implemented: OPQA is developing a plan and a set of criteria. Actions not implemented: OPQA reviews, both in process and end of examination (allowance) reviews, do not include an examination of the adequacy and comprehensiveness of the examiner's search. USPTO officials will pilot their plan and commence such reviews in fiscal year 2006.
Enhance the quality of the reviewable record of the examination process.	Partial	Actions implemented: Revised the interview summary form to provide a means for applicants and examiners to provide additional information on the content of interview. Revised the *Manual of Patent Examining Procedures* to reflect the change, and informally trained examiners. Examiners and applicants are strongly encouraged, but not required, to elaborate on decisions or the content of interviews. Actions not implemented: Examiners and applicants are not currently required to provide additional information regarding the content of interviews or elaborate on the reasons for decisions.
Legislative and rule changes		
Delete the requirement for physical surrender of the original patent when USPTO reissues a patent that was defective.	Implemented	Actions implemented: Implemented through rules changes that became effective in September 2004.
Certify the legal knowledge of patent attorneys and agents registering to practice before USPTO, and periodically recertify the legal knowledge of registered attorneys and agents and harmonize ethics standards with those used by states.	Partial	Actions implemented: In 2004, USPTO selected a contractor and began offering registration examinations electronically year–round. In December 2003, USPTO issued proposed rules to harmonize ethics and disciplinary actions with the requirements in place in most states, and obtained OMB approval for the ethics and disciplinary changes. USPTO will adjust questions on the registration examination as needed to reflect changes in patent law and practice. Actions not implemented: USPTO did not acquire the hardware and software to accept electronic registration forms due to funding limitations, according to USPTO officials. As of December 2004, USPTO had not implemented a continuing legal education program and recertification examination that was to have been in place.

(Continued From Previous Page)

Capability initiatives	Status of actions planned through December 2004	Implementation details
Evaluate whether to adopt a unity standard to harmonize U.S. examination practices with international standards and allow U.S. applicants to obtain a single patent on related claims that must currently be pursued in separate patent applications in the United States.	Partial	Actions implemented: In 2003, USPTO began a study of the changes needed to adopt a unity standard and sought public comment. Based on the comments received, USPTO consulted with stakeholders on other options. In 2004 the agency conducted a business impact analysis of four options that is currently under review. Actions not implemented: USPTO has not completed its analysis, reached a decision, or drafted and introduced implementing legislation.
Simplify adjustments to the length of time during which inventors can exclude others from making, using, or selling an invention, called the patent term.	Partial	Actions implemented: USPTO is drafting proposed legislation and obtaining administrative clearance to introduce the draft legislation. Actions not implemented: Further action depends upon passage of the legislation, which is anticipated by 2008.
Amend current legislation to permit individuals who have been assigned the rights to a patent, called the assignee, to sign an oath stating that the inventor is the original and first inventor of the invention described in the patent application.	Partial	Actions implemented: USPTO is drafting proposed legislation and obtaining administrative clearance to introduce the draft legislation. Actions not implemented: Further action depends upon passage of the legislation, which is anticipated by 2008.
Permit assignees to seek to broaden the claims in an application without the signature of the inventor.	Partial	Actions implemented: The change requires legislation to amend current law and subsequent rule making by USPTO. USPTO is drafting legislation. Actions not implemented: Further action depends upon passage of the legislation, which is anticipated by 2008. May be merged with the initiative above.
Correct an inconsistency regarding the treatment of unintentionally delayed submission of claims related to a previously filed provisional patent application.	Partial	Actions implemented: The change requires legislation to amend current law and subsequent rule making by USPTO. USPTO is drafting legislation. Actions not implemented: Further action depends upon passage of the legislation, which is anticipated by 2008.
Eliminate provisions that allow inventors to request publications of redacted versions of their applications and that require USPTO to publish applications for plant patents, which are typically granted in less time than the 18-month requirement to publish applications.	Partial	Actions implemented: USPTO is drafting proposed legislation and obtaining administrative clearance to introduce the draft legislation. Actions not implemented: Further action depends upon passage of the legislation, which is anticipated by 2008.

(Continued From Previous Page)

Capability initiatives	Status of actions planned through December 2004	Implementation details
Amend current legislation regarding certain limitations on an inventor's right to obtain a patent. Currently, inventors are barred from obtaining a patent on one or more claims that have already been patented by another or published in domestic or foreign applications, unless the applicant files within one year of publication. Because examiners have not determined whether claims in published applications are patentable, the initiative is to delete the bar as it relates to published domestic or foreign applications, and to retain the bar only as it relates to claims in patents that have been granted.	Partial	Actions implemented: The change requires legislation to amend current law and subsequent rule making by USPTO. USPTO is drafting legislation. Actions not implemented: Further action depends upon passage of the legislation, which is anticipated by 2008.

Source: GAO analysis of USPTO data.

Strategic Theme: Productivity

The agency's productivity initiatives are designed to accelerate the time to process patent applications by offering a range of examination options to applicants, reducing the responsibilities examiners have for searches of literature related to applications (pendency and accelerated examination), and creating financial incentives for applicants as well as an improved postgrant review process (shared responsibility).

Table 9: USPTO Productivity Initiatives

Productivity initiatives	Status of actions planned through December 2004	Implementation details
Fee restructuring	Partial	Actions implemented: For 2005 and 2006, Congress passed legislation allowing USPTO to increase and restructure the fees it charges applicants to include separate components for filing the application, the examiner's search of relevant literature, and the review of specifications for the proposed invention to determine their patentability. In addition the legislation grants USPTO the authority to refund portions of the domestic and international application fees under certain circumstances and to charge higher fees for applications with claims and drawings for the proposed invention that exceed 100 pages. Actions not implemented: USPTO has not issued proposed or final rules to allow for refunding domestic fees.

(Continued From Previous Page)

Productivity initiatives	Status of actions planned through December 2004	Implementation details
Offer patent applicants a choice of up to five examination options based in part on the ability to rely on searches conducted by other entities and revise fees accordingly.	Not implemented	Progress to date: Preliminary planning only. Actions not implemented: This initiative is related to the flexibility and work-sharing initiatives, and implementation depends upon access to additional funds, according to USPTO officials. In 2005, USPTO will continue efforts to select contractors and negotiate bi- and multilateral agreements with other intellectual property offices.
Offer applicants seeking patents the option for an accelerated examination in exchange for payment of a fee.	Not implemented	Actions implemented: This initiative seeks to expand the option for accelerated examination to applicants for all types of patents. The option is currently available to applicants seeking utility patents but is not widely used. Actions not implemented: USPTO has not conducted a pilot program or drafted proposed rules or legislation.
Revise postgrant review procedures to allow for greater public input.	Not implemented	Actions implemented: USPTO drafted proposed legislation that was introduced in 2004 but not passed. House members of both parties have indicated they will introduce the legislation for consideration by the current session. Actions not implemented: Because the legislation was not enacted, no implementing rules or other actions were taken. The legislation and rule changes are expected to be in place by 2008.

Source: GAO analysis of USPTO data.

Strategic Theme: Agility

To become an organization that responds quickly and efficiently to changes in the economy, the marketplace, and the nature and size of workloads, USPTO developed initiatives to implement electronic beginning-to-end processing of patents (e-government), increase reliance on the private sector or other intellectual property offices (flexibility), and streamline international patent systems and strengthen protection of patent rights as well as share search results with other international patent offices (global development).

Table 10: USPTO Agility Initiatives

Agility initiatives	Status of actions planned through December 2004	Implementation details
Establish an information technology security program for fully certifying and accrediting the security of automated information systems.	Implemented	Actions implemented: In 2003 and 2004, USPTO achieved full accreditation and certification for its seven mission critical systems, its classified system, and its eight business essential systems. External reviewers noted that many of the risks they identified could be addressed in the course of routine administration, although some, such as development of policy statements and monitoring programs, would need strategic planning and resources to address. In 2004, the Office of the Inspector General removed information security as a material weakness at USPTO. The agency has an ongoing program to annually complete security self-assessments of major systems including the use of scanning tools to identify weaknesses and intrusion detection systems. In 2003 and 2004, all USPTO staff and contractors completed the annual security training requirements.
Implement an operational system to process patent applications electronically, including electronic image capture of all incoming and outgoing paper documents.	Partial	Actions implemented: Using an incremental approach, USPTO adopted an image-based electronic-processing system for examiners. In fiscal year 2004, examiners processed almost 90 percent of patent applications electronically. In 2003, all paper files of pending applications and newly received applications were scanned into image files, and applicants could access their files over the Internet. In 2004, the public could access all publicly available patent application files via the Internet. Actions not implemented: USPTO did not achieve the ability to exchange electronic documents with the European Patent Office (EPO) that had been anticipated. Some tasks were eliminated due to both technical changes in the electronic systems used by each office and budgetary concerns. However, USPTO is still working with EPO to finalize security and protocol between the two servers. In addition, USPTO is waiting for EPO to deliver software that creates a submission package in compliance with USPTO's national electronic filing standards.
Develop an automated information system to support a postgrant patent review process.	Partial	Actions implemented: Rules have been changed to generally allow for electronically filing of documents and for adopting streamlined processes implemented since 1998. In 2002, USPTO began a pilot program and trained additional judges in the streamlined procedures. Actions not implemented: USPTO has not defined e-records management schedules, completed the design for basic electronic- processing, or implemented full electronic-processing capabilities, such as text searching of all documents and the ability to receive, file, store, and view multimedia files.

(Continued From Previous Page)

Agility initiatives	Status of actions planned through December 2004	Implementation details
Ensure continuity in the availability of business critical data in the event of a catastrophic failure of the agency's data center.	Partial	Actions implemented: USPTO has completed its analysis of the impact to its business operations from the catastrophic loss of data and efforts to recover essential data. Specifically, USPTO has identified critical services and the associated applications required to provide those services; assessed how critical applications are to business operations; compiled recovery priority lists for each line of business; and compiled vendor cost data to support its plan. Actions not implemented: USPTO has not had sufficient funding to acquire the hardware, software, staff, and facilities for a secondary data center. Acquisition of the secondary data center, scheduled for operation in June 2004, has been postponed until 2005 and remains dependent on adequate funding. Until USPTO acquires funding for the secondary data center, the agency will continue to back up its critical data on a daily basis to tapes that are stored in a separate location.
Promote substantive patent law harmonization in the framework of the World Intellectual Property Organization (WIPO), resolve major issues, and pursue harmonization goals to strengthen the rights of American intellectual property owners by making it easier to obtain international protection for their inventions.	Partial	Actions implemented: Substantive patent treaty discussions were held in May 2004 during the meeting of the WIPO Standing Committee on the Law of Patents in Geneva. Major issues addressed included the first-to-file (European standard) versus the first-to-invent (U.S. standard), subject matter eligibility, and access to genetic resources. Because of the sensitive and confidential nature of this initiative, specific details were not published and no date was given for implementation.
Pursue bi- or multilateral agreements with other intellectual property offices to share patent search results.	Partial	Actions implemented: Pilot programs to compare search results were completed in 2003 and 2004 with the Japan and European Patent Offices and with patent offices in Australia and the United Kingdom. Analysis of the results was hampered because the pilot programs did not allow for sharing of search histories. A new pilot is ongoing that includes sharing information on the areas searched and on the queries used. USPTO is working to effect legal changes that would facilitate the use of searches conducted by other intellectual property offices. No date was given for completion of the ongoing pilot or implementation of search sharing and legislative changes.
Accelerate Patent Cooperation Treaty (PCT) reform efforts, focusing on USPTO's proposal to simplify processing.	Partial	Actions implemented: USPTO indicated that some reform procedures were adopted in January 2004. Because of the sensitive and confidential nature of this initiative, specific details were not published and no date was given for implementation. USPTO indicated it would continue to press for further reforms at the PCT Reform Working Group meeting in May 2005.

(Continued From Previous Page)

Agility initiatives	Status of actions planned through December 2004	Implementation details
Rely on private sector to classify patent documents.	Not implemented	Progress to date: In 2002 and 2003, USPTO began to identify potential contractors, obtained OMB agreement to contract the search activities, and began to define the contract requirements. According to agency officials, funding constraints halted further action. The efforts were planned for implementation in the spring of 2004. Update: In 2005, USPTO will assign a new team to determine what changes, if any, are needed because of the delayed implementation.
Rely on private sector to support national application and Patent Cooperation Treaty search activities.	Not implemented	Progress to date: In 2002 and 2003, USPTO began to identify potential contractors, obtained OMB agreement to contract the search activities, and began to define the contract requirements. According to agency officials, funding constraints halted further action. The efforts were planned for implementation in the spring of 2004. Update: In 2005, USPTO will assign a new team to determine what changes, if any, are needed because of the delayed implementation.
Rely on private sector to transition to a new patent classification system harmonized with the systems used by the Japan and European Patent Offices.	Not implemented	Progress to date: In 2002 and 2003, USPTO began to identify potential contractors, obtained OMB agreement to contract the search activities, obtained legal advice, and began to define the contract requirements. According to agency officials, funding constraints halted further action. The efforts were planned for implementation in the spring of 2004. Update: In 2005, USPTO will assign a new team to determine what changes, if any, are needed because of the delayed implementation.
Develop stringent conflict of interest clauses for search firms rather than a program to certify search firms.	Not implemented	Progress to date: In 2002 and 2003, USPTO began to identify potential contractors, obtained OMB agreement to contract the search activities, and began to define the contract requirements. According to agency officials, funding constraints halted further action. The efforts were planned for implementation in the spring of 2004. Update: In December 2004, legislation passed by Congress set new requirements for outsourcing searching functions, which no longer includes certification of search firms, but instead requires stringent conflict of interest clauses.

Source: GAO analysis of USPTO data.

GAO Contact and Staff Acknowledgments

GAO Contact

Anu K. Mittal, (202) 512-3841

Staff Acknowledgments

In addition to the contact named above, Cheryl Williams, Vondalee R. Hunt, Lynn Musser, Cynthia Norris, and Ilga Semeiks made significant contributions to this report. Allen Chen, Amy Dingler, Omari Norman, Don Pless, and Greg Wilmoth also contributed to this report.

GAO's Mission

The Government Accountability Office, the audit, evaluation and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's Web site (www.gao.gov). Each weekday, GAO posts newly released reports, testimony, and correspondence on its Web site. To have GAO e-mail you a list of newly posted products every afternoon, go to www.gao.gov and select "Subscribe to Updates."

Order by Mail or Phone

The first copy of each printed report is free. Additional copies are $2 each. A check or money order should be made out to the Superintendent of Documents. GAO also accepts VISA and Mastercard. Orders for 100 or more copies mailed to a single address are discounted 25 percent. Orders should be sent to:

U.S. Government Accountability Office
441 G Street NW, Room LM
Washington, D.C. 20548

To order by Phone: Voice: (202) 512-6000
TDD: (202) 512-2537
Fax: (202) 512-6061

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm
E-mail: fraudnet@gao.gov
Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Gloria Jarmon, Managing Director, JarmonG@gao.gov (202) 512-4400
U.S. Government Accountability Office, 441 G Street NW, Room 7125
Washington, D.C. 20548

Public Affairs

Paul Anderson, Managing Director, AndersonP1@gao.gov (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, D.C. 20548

Attachment

United States Government Accountability Office

GAO

Report to Congressional Committees

June 2005

INTELLECTUAL PROPERTY

Key Processes for Managing Patent Automation Strategy Need Strengthening

GAO-05-336

June 2005

INTELLECTUAL PROPERTY

Key Processes for Managing Patent Automation Strategy Need Strengthening

GAO Accountability·Integrity·Reliability

Highlights

Highlights of GAO-05-336, a report to congressional committees

Why GAO Did This Study

The volume and complexity of patent applications to the U.S. Patent and Trademark Office (USPTO) have increased significantly in recent years, lengthening the time needed to process patents. Annual applications have grown from about 185,000 to over 350,000 in the last 10 years and are projected to exceed 450,000 by 2009 (see figure). Coupled with this growth is a backlog of about 750,000 applications.

USPTO has long recognized the need to automate its patent processing and, over the past two decades, has been engaged in various automation projects. Accordingly, GAO was asked to, among other things, assess progress to date and any problems facing USPTO as it develops the capability to efficiently handle patent information electronically.

What GAO Recommends

To better position USPTO to improve its patent process through the use of automation, GAO is making recommendations to the Secretary of Commerce that address the agency's management of its patent automation strategy and related information technology investments. In commenting on this report, USPTO generally agreed with our findings, conclusions, and recommendations. However, the agency only partially agreed with several material aspects of our assessment.

www.gao.gov/cgi-bin/getrpt?GAO-05-336.

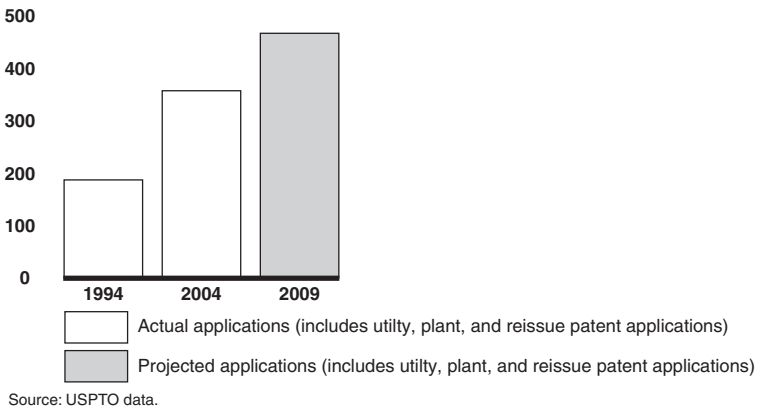
To view the full product, including the scope and methodology, click on the link above. For more information, contact Linda Koontz at (202) 512-6240 or koontzl@gao.gov.

What GAO Found

As part of its strategy to achieve a paperless, electronic patent process, USPTO had planned to deliver an operational patent system by October 2004. It has been able to deliver important capabilities, such as allowing patent applicants to electronically file and view the status of their patent applications and the public to search published patents. Nonetheless, after spending over $1 billion on its efforts from 1983 through 2004, the agency's existing automation has not provided the fully integrated, electronic patent process articulated in its automation plans, and when and how this process will be achieved is uncertain. Key systems that USPTO is relying on to help reach this goal—an electronic application filing system and a document imaging system—have not provided capabilities that are essential to operating in a fully electronic environment. Contributing to this situation is that the agency took an ad hoc approach to planning and managing its implementation of these systems, in which it lacked effective analysis of system requirements, alternatives, and costs; made acquisition decisions based on management judgment; and acquired software that did not meet its needs.

USPTO's ineffective planning and management of its patent automation initiatives, in large measure, can be attributed to enterprise-level, systemic weaknesses in its information technology investment management processes. Although the agency had begun instituting essential investment management mechanisms, such as its enterprise architecture framework, it had not yet finalized its capital planning and investment control process nor established necessary linkages between the process and its architecture to guide the development and implementation of its information technology. The Under Secretary of Commerce for Intellectual Property and USPTO's chief information officer acknowledged the need for improvement, but specific plans for resolving problems have not yet been developed.

Actual and Projected Patent Applications, Fiscal Years 1994–2009



Source: USPTO data.

Contents

Letter 1

Results in Brief 2
Background 4
USPTO Continues to Pursue a Fully Automated Patent Process, but Is Not Effectively Managing Its Strategy for Achieving This Capability 9
USPTO's Patent Automation Is Not Supported by Essential Information Technology Investment Management Processes 17
Conclusions 20
Recommendations for Executive Action 21
Agency Comments and Our Evaluation 21

Appendixes

Appendix I: Scope and Methodology 26
Appendix II: Comments from the U.S. Patent and Trademark Office 28
Appendix III: GAO Contact and Staff Acknowledgments 34

Figures

Figure 1: USPTO Actual and Projected Patent Applications, Fiscal Years 1994-2009 5
Figure 2: USPTO's Patent Process 7
Figure 3: USPTO's Patent Automation Progress 11

Abbreviations

APS	Automated Patent System
OCIO	Office of Chief Information Officer
OCR	optical character recognition
PDF	portable document format
SIRA	Search and Information Resources Administration
TEAM	Tools for Electronic Application Management
USPTO	United States Patent and Trademark Office

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, D.C. 20548

June 17, 2005

The Honorable Frank R. Wolf
Chairman
Subcommittee on Science, the Departments of State,
Justice, and Commerce, and Related Agencies
Committee on Appropriations
House of Representatives

The Honorable F. James Sensenbrenner, Jr.
Chairman
Committee on the Judiciary
House of Representatives

The United States Patent and Trademark Office (USPTO) helps to promote industrial and technological progress in the United States and to strengthen the national economy by administering the laws relating to patents and trademarks. A critical part of the agency's mission is to examine patent applications and issue patents. However, the rapid growth in both the volume and complexity of applications to USPTO has lengthened the time necessary to process patents and raised concerns about the quality of the patents that are issued. The number of patent applications filed annually has increased 91 percent over the last 10 years, from about 185,000 in 1994 to over 350,000 in 2004. Coupled with this growing workload is a 28-month backlog of approximately 750,000 applications.

USPTO has long recognized the need to improve its patent processing capability and, for the past two decades, has engaged in various efforts to automate its patent process. In light of the agency's actions, at your request, this report describes USPTO's strategy for automating its patent process and assesses its progress and any problems faced in developing and using electronic information and systems to achieve this capability. We plan to issue a separate report that will address the agency's progress in achieving its strategic milestones and maintaining a qualified workforce.[1]

To accomplish this objective, we reviewed USPTO's current and selected past initiatives to develop and implement automated patent processing capabilities. We analyzed programmatic and technical documentation

[1]GAO, *Intellectual Property: USPTO Has Made Progress in Hiring Examiners, but Challenges to Retention Remain*, GAO-05-720 (Washington, D.C.: June 17, 2005).

describing the agency's patent process, current electronic processing capabilities, and plans for future automation. We also evaluated available project management documentation, such as project plans, time lines, and status reports, to determine its progress in implementing a fully automated patent process. In addition, we assessed the agency's consideration of key information technology investment management processes and practices in planning and managing the patent automation initiatives. Further, we reviewed agency information on the cost of its automation efforts; however, we did not verify the accuracy of the cost data. To supplement our analysis, we interviewed senior patent officials, including the Deputy Commissioner for Patent Resources Planning and the USPTO chief information officer and, as part of a series of focus groups, selected patent examiners regarding the implementation and use of the systems supporting USPTO's patent process. We also discussed the patent automation efforts with the Under Secretary of Commerce for Intellectual Property (who serves as the director of USPTO). We conducted our study from June 2004 through April 2005 in accordance with generally accepted government auditing standards. Appendix I contains a detailed discussion of the scope and methodology of our review.

Results in Brief

USPTO is pursuing a long-standing strategy to implement a paperless, electronic patent process, with the goal of replacing the manual processing of applications with capabilities for electronically researching patent information and viewing and manipulating application text throughout all processing phases. To achieve this electronic process, the agency plans to integrate its existing systems that enable capabilities such as electronic filing of applications with new document imaging and text processing and sophisticated document management and workflow capabilities. As part of its 21st Century Strategic Plan, issued in 2002, the agency announced an acceleration of its goal of delivering an operational system to electronically process patents—from fiscal year 2006 to October 1, 2004.

USPTO has made progress in delivering functionality through information systems that it has implemented, such as electronic filing and patent application classification and search, as well as Internet access for patent applicants and the public, respectively, to view the status of their applications and to search existing published patents. Nonetheless, collectively, these automated functions have not provided the fully integrated end-to-end patent processing capability articulated in USPTO's automation plans. Two of the primary systems that the agency is relying on to enhance its capabilities—its electronic filing system and a document

imaging system that it acquired from the European Patent Office called Image File Wrapper—have not yielded processing improvements that the agency had deemed essential to operate successfully in an electronic environment. Specifically, patent filers have stated that the electronic filing system is cumbersome, time-consuming, and costly, and does not meet their business and technical needs; thus, fewer than 2 percent of all patent applications are submitted to USPTO electronically. In addition, the Image File Wrapper has experienced performance problems and, according to patent officials, has not provided many of the capabilities deemed essential to eliminating manual actions and improving worker productivity. Contributing to this situation is that the agency took an ad hoc approach to planning and managing its implementation of these systems. Information technology best practices emphasize the need for agencies to undertake projects in a disciplined manner based on well-established business cases that articulate agreed-upon business and technical requirements; include analyses of project alternatives, costs, and benefits; and include measures for tracking project costs, schedules, and performance through their life cycle. However, patent officials did not rely on such critical measures to guide their implementation of these key initiatives.

USPTO's ineffective planning and management of its patent automation projects, in large measure, can be attributed to enterprise-level, systemic weaknesses in the agency's overall information technology investment management processes. A key premise of the Clinger-Cohen Act of 1996[2] is that agencies should have established processes, such as capital planning and investment controls, to help ensure that information technology projects are implemented at acceptable costs and within reasonable and expected time frames, and contribute to tangible, observable improvements in mission performance. In addition, as our Enterprise Architecture Framework[3] stresses, information technology projects should show evidence of compliance with the organization's architecture. Although USPTO had begun instituting certain essential information technology investment management mechanisms, it had not yet finalized its capital planning and investment control process nor established necessary linkages between the process and its enterprise architecture to ensure that projects will comply with the architecture. Further, a study

[2]40 U.S.C. sec. 11312.

[3]GAO, *Information Technology: A Framework for Assessing and Improving Enterprise Architecture Management* (Version 1.1), GAO-03-584G (Washington, D.C.: April 2003).

commissioned by the agency in 2004 found that its Office of Chief Information Officer was not organized to help accomplish the automation goals set forth in its strategic plan and that the agency's investment management processes did not ensure appropriate reviews of automation initiatives. As a result, USPTO had not rigorously assessed its patent systems' compliance with the enterprise architecture, and it lacked reliable experience-based data to consistently demonstrate the costs and benefits of its systems.

In light of the problems that USPTO has encountered with its existing capabilities, we are recommending that the agency, before proceeding with any new patent automation initiatives, (1) reassess, and, where necessary, revise its approach for implementing and achieving effective uses of information systems supporting a fully automated patent process; (2) establish disciplined processes for planning and managing the development of patent systems based on well-established business cases; and (3) fully institute and enforce information technology investment management processes and practices to ensure that its automation initiatives support the agency's mission and are aligned with its enterprise architecture.

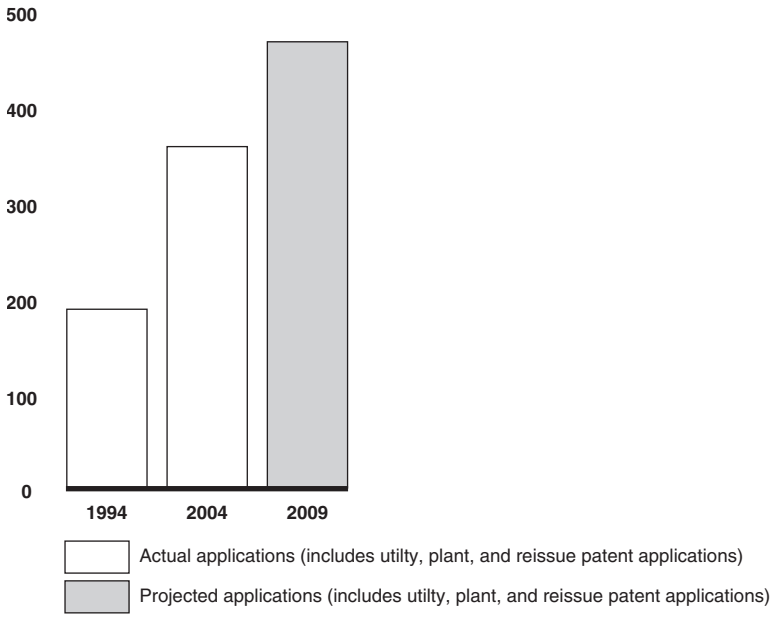
In its written comments on a draft of our report (reprinted in app. II), USPTO generally agreed with our findings, conclusions, and recommendations. The agency acknowledged weaknesses in its processes used to manage patent automation and agreed with the need for key improvements, such as (1) developing architectural linkages to the planning process, (2) implementing a capital planning and investment control guide, and (3) completing planned organizational changes. Nonetheless, the agency stated that it only partially agreed with several material aspects of our assessment. For example, the agency pointed to our awareness of it having initiated a review of the architectural linkages to its investments and key decision-making processes. However, during our study, agency officials did not inform us of any specific actions that had been taken in this regard. As the agency moves forward with actions to improve its patent automation, having firmly established and enforced investment management practices will be essential to achieving more effective use of its information technology.

Background

A patent is a property right granted by the U.S. government to an inventor who secures, generally for 20 years from the date of initial application in the United States, his or her exclusive right to make, use, offer for sale, or

sell the invention in exchange for disclosing it.[4] As indicated in figure 1, the number of patent filings to USPTO continues to grow and, by 2009, the agency is projecting receipt of over 450,000 patent applications annually.

Figure 1: USPTO Actual and Projected Patent Applications, Fiscal Years 1994-2009



Source: USPTO data.

USPTO has repeatedly cited the growing workload of patent applications and the difficulty in managing the volumes of paper associated with patent processing as impediments to carrying out its mission.

Patent processing essentially involves three phases: pre-examination, examination, and post-examination. The process begins when an applicant files a patent application and pays a filing fee. As part of the pre-examination phase, USPTO staff document receipt of the application and process the application fee, scan and convert the paper documents to

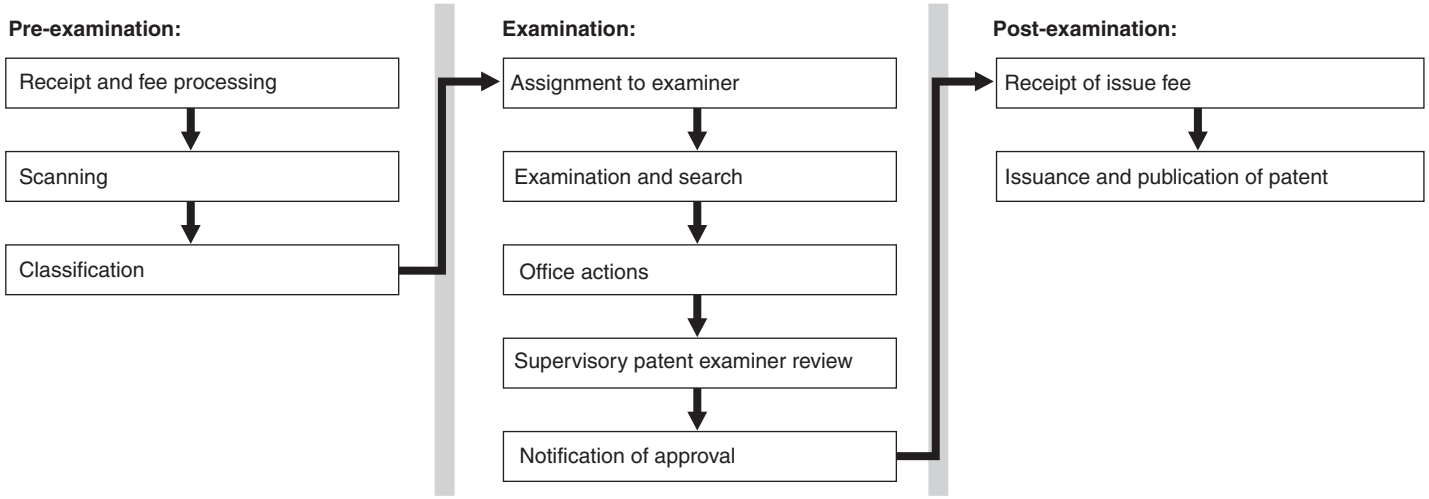
[4]According to 35 U.S.C. sec. 154(a)(1), a patentee may also exclude others from importing the patented invention into the United States.

electronic format, and conduct an initial review of the application and classify it by subject matter. During the subsequent examination phase, the application is assigned to a patent examiner with expertise in the subject area,[5] who searches existing U.S. and foreign patents, journals, and other literature (called "prior art") and sometimes contacts the applicant to resolve questions and obtain additional information to determine whether the proposed invention can be patented.[6] Examiners document their determinations on the applications in formal correspondence, referred to as office actions. Applicants may abandon their applications at any time during this process. After the examiner has determined that a patent is warranted, a supervisor reviews and approves the determination and the applicant is informed of the outcome. The application then enters the post-examination phase. Upon payment of an "issue fee," a patent is granted and published. To keep the patent active, the patentee must pay maintenance fees at 3.5 years, 7.5 years, and 11.5 years. Historically, the time from the date that a patent application is filed to the date that the patent is either granted or the application is abandoned has been called "patent pendency." Figure 2 summarizes USPTO's patent process.

[5]USPTO has eight technology centers that define its subject areas as follows: Biotechnology and Organic Chemistry; Chemical and Materials Engineering; Computer Architecture, Software, and Information Security; Communications; Semiconductors, Electrical and Optical Systems and Components; Designs for Articles of Manufacture; Transportation, Construction, Electronic Commerce, Agriculture, National Security and License and Review; Mechanical Engineering, Manufacturing, and Products.

[6]A proposed invention is patentable if it is a new or useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.

Figure 2: USPTO's Patent Process



Source: USPTO.

In 1999, Congress gave USPTO broad responsibility for managing its operations and controlling its budget allocations and expenditures, personnel decisions and processes, procurement, and information technology operations.[7] USPTO's Search and Information Resources Administration (SIRA) within the Office of Patent Resources Planning, along with its Office of Chief Information Officer (OCIO), are responsible for ensuring that the agency's goal of providing an automated patent process is met. SIRA is responsible for identifying patent processing business needs, ensuring that the systems developed meet those needs, and providing program resources. OCIO determines how best to use information technology to fulfill the identified business needs and is responsible for the acquisition, development, and integration of the information systems.

[7]The American Inventors Protection Act of 1999, 35 U.S.C. sec. 1(a) gave USPTO greater flexibility and independence for decisions regarding the management and administration of its operation, while the Secretary of Commerce retained policy direction. In addition, 35 U.S.C. sec. 2(b)(2)(F) empowered the USPTO director to establish regulations that provide for the development of a performance-based process that includes quantitative and qualitative measures and standards for evaluating cost-effectiveness and is consistent with principles of impartiality and competitiveness.

Because of long-standing concerns about the increasing volume and complexity of patent applications, USPTO has been undertaking projects to automate its patent process for about the past two decades. One of the agency's most substantial undertakings was the Automated Patent System (APS)—a project begun in 1983 with the intent of automating all aspects of the paper-intensive patent process. With this system, USPTO anticipated significant improvements in patent quality and productivity. APS was to be deployed in 1990, maintained through 2002, and, when completed, consist of five integrated subsystems that would (1) fully automate incoming patent applications; (2) allow examiners to electronically search the text of granted U.S. patents and access selected abstracts of foreign patents; (3) scan and allow examiners to retrieve, display, and print images of U.S. patents; (4) help examiners classify patents; and (5) support on-demand printing of copies of patents.

In reporting on APS more than 10 years following its inception, we noted that USPTO had deployed and was operating and maintaining certain parts of the system, supporting text search, limited document imaging, order-entry and patent printing, and classification activities.[8] However, it had not yet developed the system that was expected to fully automate incoming applications and the management of these applications as they moved through USPTO, and the estimated date for full deployment of APS had been delayed 7 years, to 1997.

Our report raised concerns about USPTO's ability to adequately plan and manage this major project, pointing out that the agency's processes for exercising effective management control over APS were weak. We noted that the agency lacked reliable, experience-based data to show that patent quality had improved and expected benefits were being achieved and its officials were relying on management judgment alone in setting APS development and deployment priorities. In light of these concerns, we recommended to the Secretary of Commerce that USPTO establish a process for identifying and measuring expected benefits to users of the system, implement a systematic and repeatable process for estimating the system's costs, and monitor progress against baselines. USPTO agreed with the need for such measures.

[8]GAO, *Patent and Trademark Office: Key Processes for Managing Automated Patent System Development Are Weak*, GAO/AIMD-93-15 (Washington, D.C.: Sept. 30, 1993).

Through 2002, the agency continued to enhance its capabilities enabling examiners to search patent images and text, and upgraded its patent application classification and tracking systems.[9] It also began providing electronic bibliographic information from patents to the public. Nonetheless, USPTO never fully developed and deployed APS to achieve the integrated, end-to-end patent processing system that it envisioned. The agency reported spending approximately $1 billion on the initiative from 1983 through 2002.[10]

In 1998, the agency added to its automated capability by implementing an Internet-based electronic filing system, enabling applicants to submit their applications online. It further enhanced the electronic filing system in 2002, and again in 2004. USPTO reported spending a total of $10 million for this system.

USPTO Continues to Pursue a Fully Automated Patent Process, but Is Not Effectively Managing Its Strategy for Achieving This Capability

Recognizing that growth in the number and complexity of patent applications has outpaced its ability to meet demands and effectively manage its workload in a paper-based environment, USPTO has continued to pursue a strategic agenda emphasizing paperless, end-to-end, automated patent processing, as was its intent with APS. However, while progress has been made, the agency has not yet achieved a fully electronic patent processing capability. Key systems that USPTO is relying on to help achieve this capability have not yielded essential processing improvements, in part resulting from the agency's ad hoc approach to planning and managing their implementation. Contributing to this situation is that USPTO has not yet fully instituted disciplined processes and practices for managing its information technology investments.

USPTO's Strategy Called for a Fully Electronic Patent Process

As part of its automation strategy, USPTO planned to develop and integrate multiple systems that are intended to move all of its critical patent processing components to an electronic business environment. To support this strategy, in 2001, the agency undertook its Tools for Electronic Application Management (TEAM) automation project with the intent of

[9]The initial deployment of USPTO's patent tracking system occurred in 1980. This system provides workflow tracking, status reporting, and examiner production information.

[10]The reported cost included system enhancements and maintenance through the end of the project's life cycle in 2002.

delivering an end-to-end capability to process patent applications electronically by fiscal year 2006. TEAM was to support the entire patent application process in electronic mode, beginning with the filing of an application and proceeding through pre-examination, examination, and post-examination to electronic records archiving.

Under the TEAM concept, the agency had planned to integrate its existing electronic filing system and the classification and search capabilities from the earlier APS project with new document management and workflow capabilities, and with image- and text-based processing[11] of patent applications to achieve a sophisticated means of handling documents and tracking patent applications throughout the examination process. By implementing image- and text-based capabilities, USPTO had anticipated that patent examiners would be able to view and process applications online, as well as manipulate and annotate text within a patent application, thus eliminating manual functions and improving processing accuracy, reliability, and productivity, as well as the quality of the patents that are granted.

In 2002, USPTO altered its approach to accomplishing the patent automation with the issuance of its 21st Century Strategic Plan.[12] Developed partly in response to a recognized need to improve patent quality, aggressively implement electronic government,[13] and reduce the number of patent applications pending at any one time, the strategic plan identified, among other factors, the agency's high-level information technology goals for fully automating the patent process as part of an aggressive 5-year modernization effort. The plan incorporated the automation concepts from the TEAM project, but announced an accelerated goal of delivering an operational system to electronically

[11]*Image-based processing* uses a graphic representation of documents produced by scanning paper documents or by converting electronic documents into images. To transform image content into text, optical character recognition (OCR) software is used to derive text from the image. OCR can convert image documents to hidden text, which is searchable. In *text-based processing*, the words and sentences in the document are retained as text and can be stored, processed, and retrieved by a document management system. Unlike image-based processing, text-based processing allows the text to be searched and extracted.

[12]USPTO's *21st Century Strategic Plan* was originally released in 2002 and updated in 2003.

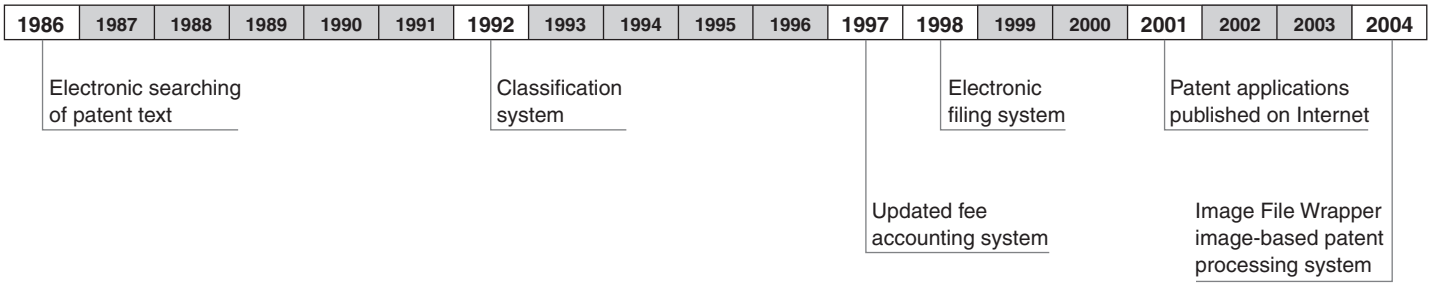
[13]Electronic government refers to the use of information technology to enhance the access to and delivery of government information and service to citizens, business partners, and employees, and among agencies at all levels of government.

process patent applications earlier than had been scheduled under TEAM—by October 1, 2004.

Progress Made, but Ad Hoc Implementation of Key Systems Has Prevented Achieving Full Electronic Processing of Patent Applications

In carrying out its patent automation plans, USPTO has made progress toward delivering important processing capabilities through the various information systems that it has implemented. For example, an automated search capability, available since 1986, has eliminated the need for patent examiners to manually search for prior art in paper files, and the classification and fee accounting capabilities have helped with assigning applications to the correct subject areas and with managing collections of applicable fees. In addition, using the electronic filing system that has existed since 1998, applicants can file their applications with the agency via the Internet. Also, using the Internet, patent applicants can review the status of their applications online and the public can electronically access and search existing published patents. Further, as a result of an imaging system implemented in August 2004, known as the Image File Wrapper, USPTO currently has the capability to scan patent applications and related documents, which can then be stored in a database and retrieved and reviewed online. Figure 3 illustrates the agency's progress in implementing its automated patent functions.

Figure 3: USPTO's Patent Automation Progress



Source: USPTO.

Nonetheless, even with the progress that has been made, collectively, USPTO's automated functions have fallen short of providing the fully integrated, electronic patent processing capability articulated in the agency's automation plans. Two of the key systems that it is relying on to

further enhance its capabilities—the electronic filing system and the Image File Wrapper—have not yielded the processing improvements that the agency has deemed essential to successfully operate in a fully integrated, electronic environment.

Specifically, in implementing its electronic filing system in 1998, USPTO had projected significant increases in processing efficiencies and quality by providing patent applicants the capability to file online, thus alleviating the need for them to send paper applications to the agency or for patent office staff to manually key application data into the various processing systems. However, even after enhancements in 2002 and 2004, the electronic filing system has not produced the level of usage among patent filers that the agency had anticipated. While USPTO's preliminary justification for acquiring the electronic filing system had projected an estimated usage rate of 30 percent in fiscal year 2004, patent officials reported that, as of April 2005, fewer than 2 percent of all patent applications were being submitted to the agency via this system. As a result, anticipated processing efficiencies and quality improvements through eliminating the manual re-keying of application data have not yet been realized.

In September 2004, USPTO convened a forum of senior officials representing the largest U.S. corporate and patent law firm filers to identify causes of patent applicants' dissatisfaction with the electronic filing system and determine how to increase the number of patents being filed electronically. According to the report resulting from this forum, the majority of participants viewed the system as cumbersome, time-consuming, costly, inherently risky, and lacking a business case to justify its usage. Specifically, among the barriers to system usage that the participants identified were (1) users' lack of a perceived benefit from filing applications electronically, (2) liability concerns associated with filers' unsuccessful use of the system or unsuccessful transmission of patent applications to USPTO, and (3) significant disruptions to filers' normal office/corporate processes and workflow caused by factors such as difficulty in using the automated tools and the inability to download necessary software through firewalls.

Further, forum participants identified features that they considered critical to increasing their use of the electronic filing system. These included implementing a more user-friendly system supported by Web-based processes; introducing a system that accepts portable document format

(PDF) files;[14] and enabling electronic filing of all documents, versus requiring paper filings of certain parts of the application, as is necessary with the current system. As incentives to increasing system usage, the participants suggested, among other strategies, that USPTO make electronic filings of applications a priority over paper filings, reduce the fee for electronic filings, and confirm the date on which the agency receives electronic applications.

Several concerns raised during the forum mirrored those that USPTO had earlier identified in a 1997 analysis of a prototype for electronic filing. However, as of April 2005, the agency had not yet completed plans to show how they would address the concerns regarding use of the electronic filing system.

Beyond electronic filing, the Image File Wrapper also has not resulted in critical patent processing improvements. Patent officials explained that, to meet the accelerated date for delivering an operational system as outlined in the strategic plan, the agency had decided in 2002 to acquire and use a document-imaging system owned by the European Patent Office, called ePhoenix, rather than develop the integrated patent processing system that had been described in the agency's automation plans. The officials stated that the director, at that time, had considered ePhoenix to be the most appropriate solution for further implementing USPTO's electronic patent processing capabilities given (1) pressures from Congress and from customers and stakeholders to implement an electronic patent processing system more quickly than originally planned and (2) the agency's impending move to its new facility in Alexandria, Virginia, which did not include provisions for transferring and storing paper patent applications.[15]

Accordingly, in November 2002, patent officials had signed a memorandum of agreement with the European Patent Office, in which that office agreed to provide USPTO with a license to use its patent processing software and to provide technical assistance in customizing the software to meet USPTO's needs. In turn, USPTO agreed to reimburse the European Patent

[14]PDF is a file format that helps reduce errors when files are transferred from one user to another. A PDF file can contain fonts, images, printing instructions, keywords, and other information related to document production.

[15]In December 2003, USPTO began relocating its headquarters from Arlington (Crystal City), Virginia, to Alexandria, Virginia, with the intent of consolidating all of its major operations in a central facility. The agency anticipates completing this move in approximately July 2005.

Office for the cost of modifying the software. It began deploying the system—which it renamed Image File Wrapper—in July 2003 and completed implementation in August 2004, at a reported total cost of approximately $14 million.[16]

The system includes image technology for storage and maintenance of records associated with patent applications and currently provides the capability to scan each page of a submitted paper application and convert the pages into electronic images. According to comments made by patent examiners in a majority of the focus groups that we conducted, the system has provided them with the ability to easily access patent applications and related information. In addition, patent officials stated that the system has enabled multiple users to simultaneously access patent applications.

However, patent officials acknowledged that the system has experienced performance and usability problems. Specifically, in speaking about the system's performance, patent officials and agency documentation stated that, after its implementation, the Image File Wrapper had been unavailable for extended periods of time or had experienced slow response times, resulting in decreased productivity. In commenting on this matter, the USPTO director stated that the system's performance has improved over the last 6 months. Further, in discussing the system's performance, OCIO and patent officials acknowledged this system problem, and told us that they had recently taken measures to alleviate its impact by, for example, developing a backup tool, which can store images of an examiner's most recent applications so that the applications can be accessed when the examiner cannot use the Image File Wrapper. However, given the recent (February 2005) implementation of this tool, the officials were not able to show any quantitative benefits from its use.

Regarding the usability of the system, patent officials and focus group results indicated that the Image File Wrapper does not fully meet processing needs. Specifically, the officials stated that, as an image-based system, the Image File Wrapper does not fully enable patent examiners to electronically search, manipulate, or track and log changes to application text, which are key processing features emphasized in the agency's automation plans. The agency's documentation also indicated that patent examiners have to print images to paper to perform certain functions such

[16]The $14 million represents a compilation of costs—provided by USPTO—for the Image File Wrapper system.

as signing their names to office actions. The examiners commented that a limited capability to convert images to text, which was intended to assist them in copying and reusing information contained in patent files, is error-prone, contributing to their need to download and print the applications for review. In addition, examiners in the focus groups expressed concerns about the Image File Wrapper's capability to manage their workload and route documents to and from examiners, noting that these capabilities are confusing and difficult to use. Further, because the office's legacy systems are not integrated with the Image File Wrapper, examiners are required to manually print correspondence from these systems, which then must be scanned into the Image File Wrapper in order to be included as part of an applicant's electronic file.

Patent and OCIO officials largely attributed the system's performance and usability problems to the agency's use of the software that it acquired from the European Patent Office. They indicated that the original design of the ePhoenix system had not been compatible with USPTO's technical platform for electronic patent processing. Specifically, they stated that the European Patent Office had designed the system to support only the printing of files for subsequent manual reviews, rather than for electronic review and processing. The officials also stated that the system had not been designed for integration with other legacy systems or to incorporate additional capabilities, such as text processing, with the existing imaging capability. Further, an official of the European Patent Office noted that ePhoenix had supported their office's much smaller volume of patent applications.[17] Thus, with USPTO's patent application workload being approximately twice as large as that of its European counterpart, the agency placed greater stress on the system than it was originally designed to accommodate. OCIO officials overseeing the Image File Wrapper told us that, although they had tested certain aspects of the system's capability, many of the problems encountered in using the system were not revealed until after the system was deployed and operational.

The European Patent Office official serving as liaison to USPTO identified similar technical problems with the Image File Wrapper. The official acknowledged that the version of the ePhoenix software that USPTO had acquired did not provide some of the capabilities that the agency wanted, such as text processing. He added that the European Patent Office was

[17]Over the past 2 years, the European Patent Office reported processing about 160,000 to 170,000 patent applications per year using ePhoenix.

developing a newer version of the software that would include text- and image-based processing capabilities. At the time of our discussion, the official said that USPTO officials had not informed them of their plans to use the newer version of the software.

Patent and OCIO officials acknowledged the problems with the Image File Wrapper and that the agency had acquired ePhoenix, although senior officials were aware that the original design of the system had not been compatible with USPTO's technological platform for electronic patent processing. They stated that, despite knowing about the many problems and risks associated with using the software, the agency had nonetheless proceeded with this initiative because senior officials, including the former USPTO director, had stressed their preference for using ePhoenix in order to expedite the implementation of a system. The officials also acknowledged that management judgment, rather than a rigorous analysis of costs, benefits, and alternatives, had driven the agency's decision to use the system.

In January 2005, patent officials told us that, given the performance and usability problems, they planned to begin replacing the Image File Wrapper in September 2005 with a system that would provide the capabilities, including text- and image-based processing, that were outlined in the agency's automation plans. Preliminary information that the agency provided about the replacement system indicated that it would cost approximately $56 million over 6 years, and would not include continued use of the European Patent Office's software. However, while having made this determination about a new system, the agency had not developed a supporting business case—based on requirements, cost/benefit, and alternatives analyses—to justify this particular acquisition, or a project plan to guide the system's implementation. Thus, it is difficult to gauge the soundness of this planned investment or how it will enable USPTO to accomplish its automation plans. In response to our concerns about the lack of project documentation to support the planning and management of this initiative, the officials stated that they would reconsider their approach to planning and carrying out this project.

USPTO's difficulty in realizing intended improvements through its electronic filing system and Image File Wrapper can largely be attributed to the fact that the agency has taken an ad hoc approach to planning and managing its implementation of these systems, driven in part by its accelerated schedule for implementing an automated patent processing capability. The Clinger-Cohen Act, as well as information technology best

practices and our prior reviews, emphasize the need for agencies to undertake information technology projects in a disciplined manner, based on well-established business cases that articulate agreed-upon business and technical requirements; effectively analyze project alternatives, costs, and benefits; include measures for tracking projects through their life cycle against cost, schedule, benefit, and performance targets; and ultimately, provide the basis for credible and informed decision making and project management. Yet, patent officials did not rely on established business cases to guide their implementation of these key automation initiatives.

With its ad hoc approach to implementing the electronic filing system and the Image File Wrapper, USPTO has continued a practice of ineffective project management that characterized its implementation of APS of two decades ago. The absence of sound project planning and management for these initiatives has left the agency without critical capabilities, such as text processing, and consequently, impeded its successful transition to an integrated and paperless patent processing environment. By continuing to implement information systems in this manner, USPTO undermines the intent of its patent automation strategy and jeopardizes its credibility regarding improving the efficiency of the patent process. At the conclusion of our review, the Under Secretary of Commerce for Intellectual Property, who also serves as the director of USPTO, stated that he recognized and intended to implement measures to address the weaknesses in the agency's planning and management of its automated patent systems.

USPTO's Patent Automation Is Not Supported by Essential Information Technology Investment Management Processes

USPTO's ineffective planning and management for its patent automation projects, in large measure, can be attributed to enterprise-level, systemic weaknesses in the agency's information technology investment management processes. A key premise of the Clinger-Cohen Act is that agencies have established processes, such as capital planning and investment control, to help ensure that information technology projects are implemented at acceptable costs and within reasonable and expected time frames, and contribute to tangible, observable improvements in mission performance. Such processes guide the selection, management, and evaluation of information technology investments by aiding management in considering whether to undertake a particular investment in information systems and providing a means to obtain necessary information regarding the progress of an investment in terms of cost, capability of the system to meet specified requirements, timeliness, and quality.

Further, as emphasized in our Enterprise Architecture Framework, information technology projects should show evidence of compliance with the organization's enterprise architecture, which serves as a blueprint for systematically and completely defining an organization's current (baseline) operational and technology environment and as a roadmap toward the desired (target) state. Effective implementation of an enterprise architecture can facilitate an agency by serving to inform, guide, and constrain the decisions being made for the agency, and subsequently decrease the risk of buying and building systems that are duplicative, incompatible, and unnecessarily costly to maintain and interface.

At the time of our study, USPTO had begun instituting certain essential information technology investment management mechanisms, such as a framework for its enterprise architecture and components of a capital planning and investment control process. However, it had not yet established the necessary linkages between its enterprise architecture and its capital planning and investment control process to ensure that its automation projects will comply with the architecture or fully instituted enforcement mechanisms for investment management. For example, USPTO drafted a capital planning and investment control guide in June 2004 and issued an agency administrative order requiring unit heads to use the guide in February 2005. However, according to senior agency officials, many of the processes and procedures in the guide had not been completed and fully implemented. In addition, while the agency had completed the framework for its enterprise architecture, it had not aligned its business processes and information technology in accordance with the architecture. Also, according to OCIO officials, the architecture review board responsible for enforcing compliance with the architecture was not yet in place; thus, current architecture reviews are only of an advisory nature and are not required for system implementation. Our analysis of architecture review documents that system officials provided for the electronic filing system and Image File Wrapper confirmed that the agency had not rigorously assessed either of these systems' compliance with the enterprise architecture.

Beyond these concerns, USPTO lacked reliable, experienced-based data and a process for consistently demonstrating that expected benefits of the systems are being achieved. As noted in our prior work, key system development decisions should be based on reliable data showing that resource investments will produce commensurate value, and as systems are developed, expected benefits and estimated costs should be periodically validated through actual experience. Although patent officials

asserted that processing improvements had resulted from the automation that had been implemented, they acknowledged that the agency had not established performance metrics to aid in measuring the impact of the automation or validated actual experiences against established baselines. Rather, patent officials told us, they had based their accounts of performance improvement, such as reductions in the number of lost or destroyed paper patent applications as a result of the Image File Wrapper, largely on ad hoc occurrences and/or feedback from patent examiners and clerical and administrative staff. As a result, the agency lacked a basis for substantiating benefits from its automation efforts.

In addition, USPTO lacked reliable cost data for the patent automation initiatives due to weaknesses in the agency's processes for tracking and reporting project expenses. Our guide on agencies' information technology investment decision-making stresses the need for reliable and current project cost data to aid management in making critical investment decisions.[18] While the agency had systems in place to track the costs of specific tasks, particularly those assigned to its contractors, it did not have an effective means of providing aggregate cost information for its overall patent automation effort. Patent officials stated that they faced difficulties in accessing and providing comprehensive cost information for the patent systems because the agency had modified its approach to capturing and reporting cost information, along with the information systems containing this information. The difficulty that USPTO management faced in providing comprehensive information on its patent automation costs could compromise the agency's ability to provide a credible accounting for its investments and make informed management decisions about them.

Adding to these conditions, a study commissioned by USPTO's senior management in 2004 found that OCIO was not organized to help USPTO achieve its mission or accomplish the goals set out in its automation strategy.[19] The study, undertaken by an independent contractor, noted that the agency's investment management processes did not ensure appropriate reviews of automation initiatives and that the chief information officer's organization lacked sufficient credibility with its business units to ensure an effective partnership. During our review, USPTO's director made

[18]GAO, *Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-making*, GAO/AIMD-10.1.13 (Washington, D.C.: February 1997).

[19]We did not independently assess the results of this study, but USPTO's chief information officer generally concurred with its findings.

changes in key leadership positions within OCIO and the Patent Resources and Planning Office, which he considered essential to defining and implementing the patent automation strategy and bringing stability to the agency's operations. However, officials had not yet begun to improve the investment management processes to ensure appropriate reviews of the agency's automation initiatives.

USPTO has an explicit responsibility for ensuring that the automation initiatives that it is counting on to enhance its overall patent process are consistent with the agency's priorities and needs and are supported by the necessary planning and management to ensure that they are successfully accomplished. USPTO's 21st Century Strategic Plan was intended to help the agency accomplish a smooth transition to performance-based operations, and having firmly established and enforced investment management practices will be crucial to achieving this. At the conclusion of our review, USPTO's director and the new chief information officer, appointed in February 2005, told us that they were aware of organizational and management weaknesses within OCIO and acknowledged the need to strengthen the agency's investment management processes and practices and effectively apply them to USPTO's patent automation initiatives.

Conclusions

USPTO has been attempting to implement an integrated, paperless patent process for about two decades and, in the process, has delivered important automated capabilities. Nonetheless, after spending over a billion dollars on its efforts, the agency is still not yet effectively positioned to process patent applications in a fully automated environment; moreover, when and how it will actually achieve this capability remains uncertain. System performance and usability problems, resulting largely from ineffective planning and management of its automated capabilities, have limited the effectiveness of key systems that the agency has implemented to support critical patent processes. USPTO's director and new chief information officer have recognized the need to improve the agency's planning and management of its automation initiatives. However, weaknesses in key information technology management processes needed to guide the agency's investments in patent automation, such as incomplete capital planning and investment controls and a lack of reliable cost data, could preclude its ability to successfully accomplish this. Under such circumstances, USPTO risks continuing to implement information technology that does not support the agency's needs, and that threatens its overall goal of achieving a fully electronic capability to process its growing patent application workload.

Recommendations for Executive Action

To more effectively position USPTO to achieve key patent processing improvements through the use of information technology, we recommend that the Secretary of Commerce direct the Under Secretary of Commerce for Intellectual Property to take the following actions before proceeding with any new patent automation initiatives:

- reassess, and where necessary, revise the approach for implementing and achieving effective uses of major information systems to support a fully automated patent process, including electronic filing and image- and text-based patent processing capabilities;

- establish disciplined processes for planning and managing the development of patent systems based on well-established business cases that articulate agreed-upon business and technical requirements; include analyses of project alternatives, costs, and benefits; and include measures for tracking projects through their life cycle against cost, schedule, benefit, and performance targets; and

- fully institute and enforce at the enterprise level, information technology investment management processes and practices to ensure that automation initiatives support the agency's mission and are aligned with the agency's enterprise architecture, to include (1) finalizing and implementing a capital planning and investment control guide, (2) establishing an architecture review board and requiring its oversight of major information technology investments, (3) establishing a process to identify expected benefits to internal and external users of information systems and to measure performance against expected benefits, and (4) establishing a process for tracking and reporting aggregate cost information for automation initiatives.

Agency Comments and Our Evaluation

In written comments on a draft of this report, the Under Secretary of Commerce for Intellectual Property and Director of USPTO generally agreed with our findings, conclusions, and recommendations. The agency acknowledged weaknesses in its processes used to manage patent automation and agreed with the need for key improvements, such as (1) developing architectural linkages to the planning process, (2) implementing a capital planning and investment control guide, and (3) completing planned organizational changes. The Under Secretary emphasized that USPTO had already initiated reforms to ensure more effective implementation of its automation projects, including personnel

changes in key patent-management positions, and indicated that the agency would rely on the results of our study in conjunction with other assessments that have been conducted to further improve management processes guiding the agency's use of information technology.

Nonetheless, the agency only partially agreed with several specific aspects of our assessment. The Under Secretary pointed out, for example, that in February 2005, USPTO had issued an agency administrative order covering its information technology investment review board and reemphasizing its commitment to integrated investment decision practices. In addition, the agency pointed to our awareness of it having also initiated a review of the architectural linkages to its investments and key decision-making processes being implemented. Further, it stated that it had instituted investment decision papers to provide its investment review board members with improved documentation, including more thorough financial, technical, and alternatives analyses, to assist in making appropriate investment decisions.

The actions that USPTO stated that it has taken could help to improve its overall investment management and decision making. In mid-April 2005, patent officials provided us with a finalized copy of the agency administrative order requiring unit heads to use the capital planning and investment control guide in selecting, controlling, and evaluating information technology investments. However, they stated that the agency had not yet completed the capital planning and investment control processes and procedures. Nonetheless, we have revised our report to reflect the agency's issuance of this order. Further, during our study, agency officials did not inform us of any specific actions that had been initiated to review architectural linkages to investments and gave no indication that the agency had instituted investment decision papers to improve information technology investment documentation and related decision making. Therefore, we lack a basis for evaluating and/or commenting on these particular actions.

USPTO also provided comments on the recommendations contained in our report. Specifically, regarding our recommendation to reassess, and where necessary, revise the approach for implementing and effectively using information systems to support a fully automated patent process, the agency commented that it was changing the method of implementing and achieving effective use of its information technology. The agency stated that it had chosen to follow a more systematic and phased approach to using information technology, in which alternatives are thoroughly

considered and evaluated against architectural standards, implementation costs, and the ability to effectively meet users' needs, and that detailed investment decision papers are being prepared for all major investments. It added that future patent development initiatives, including those for electronic filing and text-based processing capabilities, would be subjected to this approach to ensure that automated systems are used most effectively to achieve patent program goals. As the agency takes action to achieve more effective use of its information technology, we look forward to monitoring its use of these measures to successfully implement future patent automation initiatives.

Regarding our recommendation to establish disciplined processes for planning and managing the development of patent systems based on well-established business cases, USPTO stated that it was in the process of improving its capital planning and investment control process. For example, it stated that an already-established committee had proposed a format for developing improved business cases that would articulate business needs and expected benefits, require consideration of alternative solutions, and reflect compliance with the agency's enterprise architecture. As stressed in our report, such measures are essential to ensuring effective management of the agency's information technology initiatives and to achieving patent processing improvements through the use of information technology.

Finally, in commenting on our recommendation that the agency fully institute and enforce information technology investment management processes and practices at the enterprise level, USPTO (1) reiterated its actions toward improving its capital planning and investment control process; (2) stated that its Office of Applications Architecture and Services functions as the agency's architectural review board with responsibility for ensuring that information technology systems' designs comply with the enterprise architecture; (3) stated that it would, upon completion of its capital planning and investment control guide, formally establish procedures for reviewing its investments' performance against expected benefits; and (4) stated that it is refining its tools to more completely capture the total cost of its information technology investments.

Such measures, if successfully applied, could substantially improve USPTO's accountability for its information technology investments. However, it is important to note that, during our study, the agency could not provide evidence of a functioning architecture review board. Patent officials told us that such an organization had not been established and that

reviews had not been required to ensure that planned information technology projects were consistent with the enterprise architecture. As stated earlier in this report, our analysis of documentation supporting the electronic filing system and Image File Wrapper determined that the agency had not rigorously assessed either of these systems' compliance with the enterprise architecture. Given this finding, we continue to stress the need for the agency to enforce its architecture review board's oversight of major information technology initiatives.

Beyond these points of discussion, USPTO offered detailed comments on its Image File Wrapper. While agreeing with the need for more rigorous decision making to support its implementation of this system, the Under Secretary nonetheless believed that moving forward with this initiative was an appropriate step that had fulfilled the agency's promise to provide electronic (paperless) processing of patent applications, and that had provided numerous benefits for the agency in a short period of time. For example, the Under Secretary stated that the Image File Wrapper had eliminated the agency's need for space to house paper patents and, in conjunction with Internet access to patent applications, had alleviated problems associated with lost application files and file integrity. As such, the agency did not see a need to assess the key management processes guiding its decision to undertake this investment.

As reflected in this report, we recognize that the Image File Wrapper, along with Internet access to patent applications, has provided USPTO with important capabilities to support the processing of patents. However, patent officials and examiners acknowledged that performance and usability problems had rendered the system incapable of fully meeting processing needs. Further, patent and OCIO officials had largely attributed the system's problems to known limitations in the design of the software that the agency had acquired from the European Patent Office. They added that, given the performance and usability problems, the agency planned to replace the Image File Wrapper. Thus, while certain benefits should be inherent from having this system in place, in our view, the agency could nonetheless take important lessons from the ad hoc approach in which this investment was undertaken. USPTO opted to undertake this initiative in a manner that did not ensure that it had fully evaluated its patent processing requirements against the most cost-efficient and effective solution for addressing its needs. Moreover, in undertaking the initiative without full consideration of potential alternatives, costs, and benefits, the agency put itself at risk of not fully realizing desired outcomes in terms of improved processing of patent applications.

Appendix II contains the text of USPTO's comments on our draft report. The agency also provided technical comments, which we have incorporated, as appropriate.

We are sending copies of this report to the Secretary of Commerce, the Under Secretary of Commerce for Intellectual Property, and the Director, Office of Management and Budget. Copies will also be available at no charge on our Web site at www.gao.gov.

Should you have any questions on matters contained in this report, please contact me at (202) 512-6240. I can also be reached by email at koontzl@gao.gov. Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix III.

Linda D. Koontz
Director, Information Management Issues

Scope and Methodology

To accomplish our objective, we reviewed USPTO's 21st Century Strategic Plan, Tools for Electronic Application Management project documentation, and related information technology plans to determine the agency's vision for and approach to automating its patent process. We also assessed current and selected past initiatives that USPTO has undertaken to develop and implement its automated patent processing capabilities. Specifically, we analyzed programmatic and technical documentation describing the agency's patent process, current electronic patent processing capabilities, and plans for future automation. We evaluated available project management documentation, such as project plans, time lines, and project status reports to determine the agency's progress in implementing a fully automated patent processing system. In addition, to assess key decisions and actions related to the USPTO's development and use of specific electronic information and systems to support patent processing, we examined the agency's consideration of key information technology investment management procedures and practices, such as capital planning and investment control, enterprise architecture, and risk management, in planning and managing the patent automation initiatives. Further, we examined cost information for USPTO's patent automation initiatives, as provided by the agency; however, we did not verify the accuracy of this reported information.

As part of our review, we also examined internal reports documenting an independent contractor's assessment of USPTO's information technology organization. We did not independently validate the findings contained in the reports; however, in discussing their contents with us, USPTO's chief information officer generally concurred with the findings. In addition, we reviewed relevant reports discussing the patent operations that had been prepared by the Department of Commerce's Office of Inspector General.

To supplement our analysis, we interviewed senior patent officials, including the Deputy Commissioner for Patent Resources Planning; the Administrator, Search and Information Resources Administration; and the USPTO chief information officer, who was appointed in February 2005. We also discussed the agency's patent automation efforts with the Under Secretary of Commerce for Intellectual Property, who serves as the director of USPTO. In addition, we met with relevant systems officials who were involved in or knowledgeable about the development and implementation of the automated patent capabilities and with patent managers in charge of the systems' operations. We also interviewed officials of the European Patent Office who worked with USPTO on its implementation of the Image File Wrapper and representatives of the

patent examiners union. In these interviews, we discussed USPTO's strategy and supporting plans for automating the patent processes and elicited their views about and understanding of key management decisions and challenges associated with the automation initiatives.

Further, as part of a series of 11 focus groups undertaken by GAO, we obtained patent examiners' views of and experiences with the automated patent processes. The focus groups consisted of from 6 to 11 employees each and included supervisory patent examiners (3 groups) and patent examiners (8 groups). In total, 91 examiners participated in the focus groups. The 91 participants were randomly selected from the seven technical areas at USPTO's two locations (in Crystal City and Alexandria, Virginia), and all participants had been employed at the agency for at least 9 months. A GAO facilitator led each focus group. The responses were then systematically analyzed using a content analysis.

We conducted our study from June 2004 through April 2005, in accordance with generally accepted government auditing standards.

Comments from the U.S. Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

JUN - 2 2005

Ms. Linda D. Koontz
Director, Information Management Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, D.C. 20548

Dear Ms. Koontz:

Thank you for the opportunity to comment on the Government Accountability Office (GAO) draft report titled, "Intellectual Property: Key Processes for Managing Patent Automation Need Strengthening." We very much appreciate the effort your team made in reviewing the United States Patent and Trademark Office's (USPTO) processes for managing patent information technology (IT) initiatives.

When I became the Acting Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office in January 2004, I was fortunate to have had exposure to the management culture of the USPTO. Since joining the USPTO in 2002 as the Deputy Under Secretary, I observed the way in which USPTO's Patent management, Office of the Chief Information Officer (OCIO) management, and other senior managers handled decisions on IT investment and planning.

I first came to the USPTO as the Deputy Under Secretary. Then Under Secretary James Rogan made clear that a critical priority was to re-establish USPTO's reputation as an agency that makes promises and keeps promises. A key aspect of re-establishing credibility was fulfilling the commitment, made almost thirty years ago, that the USPTO would electronically process patent applications. Begun during Under Secretary Rogan's tenure in 2002, I was proud to announce fulfillment of the electronic-processing promise in August 2004 with the availability of Internet access to patent application files, just two years after beginning this historic project.

For me, an unanticipated aspect of the IFW process was exposure to the deeper issues that had prevented USPTO from fulfilling its promises and achieving its potential. During the planning and implementation of IFW, and other IT-related Strategic Plan initiatives, I better understood what needed to be changed, and why.

P.O. Box 1450, Alexandria, Virginia 22313–1450 - WWW.USPTO.GOV

Based on my observations and experience, when I became the Acting Under Secretary, I was determined to make changes to comport with my personal commitment to accountability, transparency, and results, as a steward of the USPTO on behalf of the American people.

Initially, I worked with the existing Patent and OCIO management, to encourage "change from within." However, as the head of an agency that is the repository of great technical expertise, I soon appreciated that expert advice of a different nature was necessary. Therefore, in April 2004, I directed my personal staff in the Office of the Under Secretary to conduct, using an outside, independent consulting firm with a national reputation for excellence in the field of IT organizational analysis, a complete review of USPTO's IT operations, with a focus on delivery capability to our business areas: Patents; Trademarks; Office of General Counsel; Office of the Chief Financial Officer; and Office of the Chief Administrative Officer.

As Deputy Under Secretary, I had directed an independent review of a discrete IT project -- the electronic filing forms for the Madrid Protocol (a trademark treaty). The results of that review were magnified in the larger OCIO assessment, which was formally concluded in early 2005, but whose significant findings were available to me as early as July 2004.

Based both on the earlier, discrete review, and the comprehensive organizational assessment I requested, it was clear to me that significant management changes were necessary. By October 2004, USPTO was conducting a nationwide search for a new CIO, and by early December 2004 we had identified an experienced candidate, who ultimately became our new CIO.

The OCIO organizational assessment pointed out challenges in the business areas as well. Again, based in part on information received from that comprehensive study, as well as on my observations of certain executives' responses to the GAO's own efforts, I realized that wider management changes were necessary. Therefore, in January 2005, I made personnel changes in key Patent-management positions, including the SES position responsible for Patent IT projects.

When GAO's study was announced, I was grateful because I was certain the study would function as yet another independent assessment of the USPTO's patent IT management practices, giving us even more useful data with which to work. Based on my own reform efforts, I am fully aware that our current team of managers is faced with the challenging, but achievable, task of rebuilding confidence in the USPTO's IT systems, its methods of implementation and expenditure, and its relationship with the user community. I am proud that we have in fact changed our approach.

Specifically, I have put in place managers who are committed to service, to accuracy, to integrity, and to transparency. Further, I am confident that our new CIO and our Acting Commissioner for Patents are fully committed to my vision of a USPTO that is completely accountable. They are already implementing reforms, mindful of the risk that too much change too quickly can lead to its own set of problems.

Based on my comments above, it will come as no surprise to find that we agree with GAO's conclusion that there have existed weaknesses in the management process used to direct patent automation, especially when viewed in the broad time frame from GAO's last review of the process in the early 1980s. However, we can only partially agree with several material aspects of GAO's assessment.

As noted above, I directed a comprehensive assessment of the Office of the CIO, one result of which was the hiring of our new CIO. In February 2005, we issued an Agency Administrative Order (AAO) covering the IT Investment Review Board. The AAO reemphasizes the agency's commitment to integrated investment decision practices. As you know, we have also initiated a review of the architectural linkages to investments, and the key processes for decision-making, which is currently under way. Further, we have instituted Investment Decision Papers (IDP) to provide the Investment Review Board members with improved investment documentation. The IDPs give the board members more thorough financial and technical analysis, and offer a variety of viable options and alternatives, to help the Board make appropriate investment decisions.

The following are our comments on the specific recommendations contained in the Draft Report:

Recommendation 1 – *"reassess, and where necessary, revise the approach for implementing and achieving effective uses of major information systems to support a fully automated patent process, including electronic filing and image- and text-based patent processing capabilities;"*

The USPTO is changing the method of implementing and achieving effective use of IT. We have elected to follow a more systematic, phased implementation, rather than the prior holistic approach. Alternatives are being thoroughly considered, and evaluated against architectural standards, costs of implementation and support, and the ability to effectively deliver an IT solution that meets the needs of the users. Detailed Investment Decision Papers are being prepared for all major IT investments. These papers are being reviewed by USPTO's Management Council, which sits as the Investment Review Board (IRB). The Management Council/IRB approves all major IT investments. Any future patent development initiatives, including those for electronic filing and text-based processing capabilities, will be subject to this more systematic, phased implementation in order to ensure that automated systems are used most effectively to achieve patent program goals.

Recommendation 2 – *"establish disciplined process for planning and managing the development of patent systems based on well-established business cases that articulate agreed-upon business and technical requirements; include measures for tracking projects through their life cycle against cost, schedule, benefit, and performance targets;"*

A committee has been established to improve the Capital Planning and Investment Control (CPIC) process at the USPTO. This committee has already proposed a format for business cases that recites the business need and expected benefits; that requires the consideration of at least three viable alternatives, and the total cost of each alternative; and that indicates

compliance with the enterprise architecture, including whether the investment is based on current, emerging, twilight or sunset architecture. The business case must be accompanied by an investment schedule that includes a list of milestones with dates; a listing of assumptions, constraints, and a risk assessment with mitigation strategies; and a list of critical success factors for the project. Finally, the investment schedule must explain how the proposed approach aligns with the USPTO's *21st Century Strategic Plan*, and with the President's Management Agenda (PMA).

Following approval of the business case and selection of the preferred alternative, project plans will be developed, and schedules, costs and progress will be managed against these plans, using Earned Value Management (EVM). All investments will also be evaluated against the proposed benefits.

As a result of the independent assessment conducted at my direction, we realized the need to strengthen our IT planning and management processes. Our new CIO is engaged in implementing organizational improvements that will focus on Quality Management and overall IT process improvements.

Recommendation 3 – *"fully institute and enforce at the enterprise level, information technology investment management processes and practices to ensure that automation initiatives support the agency's mission and are aligned with the agency's enterprise architecture, to include (1) finalizing and implementing a capital planning and investment control guide, (2) establishing an architecture review board and requiring its oversight of major information technology investments, (3) establishing a process to identify expected benefits to internal and external users of information systems and to measure performance against expected benefits, and (4) establishing a process for tracking and reporting aggregate cost information for automation initiatives."*

In reference to item 1, as noted in our response to the previous recommendation, the USPTO is addressing its CPIC process. Once this is made final, the existing capital planning and investment control guide will be updated to reflect the enhanced procedures.

Concerning the second item, IT project architectures are currently reviewed by the Office of Applications Architecture and Services. This office is responsible for ensuring compliance of IT systems' designs with the USPTO Enterprise Architecture. This group executes the functions performed by an architectural review board.

Regarding item 3, as the committee completes the CPIC guide, it will formally establish the procedures for review of the expected benefits from an IT investment and the evaluation of the performance of the investment against providing those expected benefits.

Finally, concerning item 4, the USPTO has the tools in place to aggregate the cost information for automation initiatives, and is refining use of those tools to more completely capture the total cost of any IT investment.

Image File Wrapper (IFW)

Given the importance of IFW to the USPTO, it is appropriate to offer detailed comments on this undertaking.

We agree that the IFW decision-making and implementation process could have been more rigorous, and would have benefited from more rigor. However, we are certain that both GAO and Congress recognize the very positive results, for our examiners and the public, which resulted from the timely deployment of the IFW system.

First, in 2004, the USPTO fulfilled a decades-old promise to the public by finally providing a working paperless system for processing patent applications. In the space of two years, USPTO concluded an effort that had been promised since the 1980s. Second, at a very practical level, IFW eliminated the need for USPTO to retain space to house the patent paper collection stored at the USPTO's Crystal City campus. Because of the IFW system, the USPTO did not have to relocate paper patent application files to our Alexandria headquarters. Third, both examiners and the public have seen the benefits of IFW since multiple users can access the same file at the same time. There is no need to wait to see an electronic file.

In addition, our Public PAIR tool offers Internet access to published patent applications, allowing users around the globe the ability to review information. Private PAIR offers patent applicants the same type of access to their unpublished application files, in a secure Internet environment. It goes without saying that the issue of lost papers or application files has been monumentally reduced. Further, problems with file integrity, that is, problems created when papers were returned to a file out of order, ripped or otherwise degraded through wear, or even lost completely, have been virtually eliminated. As a practical matter, the need to photocopy has been greatly reduced, since files can be printed directly.

To reiterate, in the space of two years, the USPTO presented the public and our examiners with historic electronic access. The manifold benefits of IFW would almost certainly not be available today had USPTO moved at a more traditional pace.

As a lesson of IFW, USPTO fully appreciates that implementation of automation and additional automated tools for both our examiners and public users must be preceded and accompanied by careful planning and documentation. But we make no apologies for having fulfilled promises and provided access and convenience for customers and employees alike.

In light of the progress that the USPTO has made even during the period of GAO's assessment, we do not believe that such significant gaps exist as to warrant a pause and reassessment of our key management processes.

We have also included an enclosure with a list of specific comments that clarify and/or correct certain points covered in your report.

We do agree with GAO's finding that key improvements need to be made, such as:

- Improving architectural linkages to the planning process;
- Making final and implementing the draft Capital Planning and Investment Control (CPIC) Guide; and
- Completing planned organizational changes.

Before concluding this letter, I would like to express personal thanks to GAO, and to mention Mary J. Dorsey, Vijay D'Souza, Valerie Melvin, Evan Gillman, Nancy Glover and J. Michael Resser. I understand that Ms. Dorsey and Mr. D'Souza, in particular, spent many hours talking to USPTO employees, conducting interviews, and of course, reviewing documents and writing the draft report itself. We are fortunate to have had the opportunity to work with such dedicated fellow civil servants.

Actions speak louder than words. As Under Secretary, I have taken the painful measures necessary to correct problems I saw with our patent automation strategy, including making personnel changes in key USPTO management positions. However, difficult as an organizational assessment and resulting personnel changes have been, they were and are the correct course of action and will result in a USPTO that is able to deliver and support, in a timely and cost-effective manner, the electronic tools that will see our Nation's patent and trademark office through the 21st Century.

Again, we appreciate this opportunity to comment on the GAO's draft report.

Sincerely,

JON W. DUDAS
Under Secretary and Director

Enclosure

GAO Contact and Staff Acknowledgments

GAO Contact

Linda D. Koontz (202) 512-6240

Staff Acknowledgments

In addition to the individual named above, Valerie Melvin, Mary J. Dorsey, and Vijay D'Souza made significant contributions to this report. Evan Gilman, Nancy Glover, and J. Michael Resser also contributed to this report.

GAO's Mission

The Government Accountability Office, the audit, evaluation and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's Web site (www.gao.gov). Each weekday, GAO posts newly released reports, testimony, and correspondence on its Web site. To have GAO e-mail you a list of newly posted products every afternoon, go to www.gao.gov and select "Subscribe to Updates."

Order by Mail or Phone

The first copy of each printed report is free. Additional copies are $2 each. A check or money order should be made out to the Superintendent of Documents. GAO also accepts VISA and Mastercard. Orders for 100 or more copies mailed to a single address are discounted 25 percent. Orders should be sent to:

U.S. Government Accountability Office
441 G Street NW, Room LM
Washington, D.C. 20548

To order by Phone: Voice: (202) 512-6000
TDD: (202) 512-2537
Fax: (202) 512-6061

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm
E-mail: fraudnet@gao.gov
Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Gloria Jarmon, Managing Director, JarmonG@gao.gov (202) 512-4400
U.S. Government Accountability Office, 441 G Street NW, Room 7125
Washington, D.C. 20548

Public Affairs

Paul Anderson, Managing Director, AndersonP1@gao.gov (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, D.C. 20548